TOSHIBA

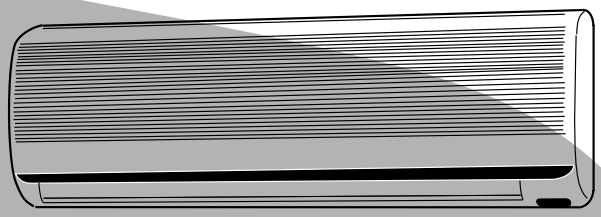
FILE NO. A10-9508

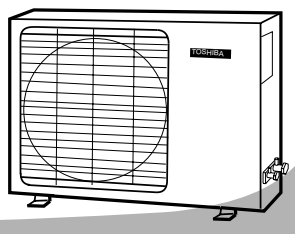
SERVICE MANUAL

AIR-CONDITIONER

SPLIT WALL TYPE

RAS-07EKH/RAS-07EAH
RAS-09EKH/RAS-09EAH





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1. SPECIFICATIONS

Item		Model	RAS-07EKH/EAH					
			Cooling			Heating		
Capacity		kW	220V	230V	240V	220V	230V	240V
	*1		1.78	1.80	1.82	1.83	1.85	1.87
		Btu/h	6070	6140	6210	6240	6310	6380
Power source		Phase	Single					
		V	220/230/240					
		Hz	50					
Power consumption		W	560/570/580			490/500/510		
Power factor		%	100/100/99			100/100/100		
Running current		A Indor/Outdoor	220V	230V	240V	220V	230V	240V
			0.19/2.36	0.20/2.28	0.22/2.22	0.19/2.04	0.20/1.97	0.22/1.91
Starting current		A	10					
Moisture removal		lit/h	0.8					
Noise	Indoor (H/M/L)	dB	43/36/31					
	Outdoor (220/230/240V)	dB	47/48/49					
Refrigerant	Name of refrigerant		R22					
	Rated volume	kg (oz)	0.65 (22.9)					
Refrigerant control			Capillary tube					
	Gas side size	mm (in)	9.52 (3/8)					
	Connection type		Flare connection					
Interconnection pipe	Liquid side size	mm (in)	6.35 (1/4)					
	Connection type		Flare connection					
	Maximum length (of one way)	m (ft) *2	10 (32.8)					
	Maximum height Indoor unit higher	m (ft)	5 (16.4)					
	Outdoor unit higher	m (ft)	5 (16.4)					
Condensale drain pipe	Outer diameter	mm (in)	16 (5/8)					
INDOOR UNIT		**RAS-**	**07EKH**					
Dimensions	Height	mm (in)	265 (10.4)					
	Width	mm (in)	790 (31.1)					
	Depth	mm (in)	155 (6.1)					
Net weight		kg (lbs)	8 (17.6)					
Evaporator type			Finned tube					
Indoor fan type			Cross flow fan					
Air volume	High fan	m^3/h (CFM)	462 (274)					
	Medium fan	m^3/h (CFM)	370 (215)					
	Low fan	m^3/h (CFM)	300 (175)					
Fan motor output		W						
Air filter			Polypropylene net filter (Washable)					
OUTDOOR UNIT		**RAS-**	**07EAH**					
Dimensions	Height	mm (in)	530 (20.9)					
	Width	mm (in)	770 (30.3)					
	Depth	mm (in)	200 (7.9)					
Net weight		kg (lbs)	29 (63.9)					
Condenser type			Finned tube					
Outdoor fan type			Propeller					
Air flow volume		m^3/h (CFM)	1500 (890)					
Fan motor output		W	18					
Compressor	Model		$PH70T_1$-4C					
	Output	W	500					
Safety device			Fuse, Overload relay					
Auto louver			Yes					
Usable outdoor temperature range		°C	21 – 43			–10 – 21		

Specifications are subject to change without notice.

Item		Model	RAS-09EKH/EAH					
			Cooling			Heating		
Capacity		kW	220V	230V	240V	220V	230V	240V
	*1		2.28	2.30	2.32	2.47	2.50	2.53
		Btu/h	7780	7850	7920	8430	8530	8630
Power source		Phase	Single					
		V	220/230/240					
		Hz	50					
Power consumption		W	740/750/760			670/680/690		
Power factor		%	95/94/92			94/92/89		
Running current		A Indor/Outdoor	220V	230V	240V	220V	230V	240V
			0.19/3.34	0.20/3.27	0.22/3.22	0.19/3.05	0.20/3.03	0.22/3.00
Starting current		A	14					
Moisture removal		lit/h	1.2					
Noise	Indoor (H/M/L)	dB	43/36/31					
	Outdoor (220/230/240V)	dB	47/48/49					
Refrigerant	Name of refrigerant		R22					
	Rated volume	kg (oz)	0.67 (23.6)					
Refrigerant control			Capillary tube					
	Gas side size	mm (in)	9.52 (3/8)					
	Connection type		Flare connection					
Interconnection pipe	Liquid side size	mm (in)	6.35 (1/4)					
	Connection type		Flare connection					
	Maximum length (of one way)	m (ft) *2	10 (32.8)					
	Maximum height Indoor unit higher	m (ft)	5 (16.4)					
	Outdoor unit higher	m (ft)	5 (16.4)					
Condensale drain pipe	Outer diameter	mm (in)	16 (5/8)					
INDOOR UNIT		**RAS-**	**09EKH**					
Dimensions	Height	mm (in)	265 (10.4)					
	Width	mm (in)	790 (31.1)					
	Depth	mm (in)	155 (6.1)					
Net weight		kg (lbs)	8 (17.6)					
Evaporator type			Finned tube					
Indoor fan type			Cross flow fan					
Air volume	High fan	m^3/h (CFM)	462 (274)					
	Medium fan	m^3/h (CFM)	370 (215)					
	Low fan	m^3/h (CFM)	300 (175)					
Fan motor output		W						
Air filter			Polypropylene net filter (Washable)					
OUTDOOR UNIT		**RAS-**	**09EAH**					
Dimensions	Height	mm (in)	530 (20.9)					
	Width	mm (in)	770 (30.3)					
	Depth	mm (in)	200 (7.9)					
Net weight		kg (lbs)	29 (63.9)					
Condenser type			Finned tube					
Outdoor fan type			Propeller					
Air flow volume		m^3/h (CFM)	1500 (890)					
Fan motor output		W	18					
Compressor	Model		$PH94T_1$-4C					
	Output	W	750					
Safety device			Fuse, Overload relay					
Auto louver			Yes					
Usable outdoor temperature range		°C	21 – 43			–10 – 21		

Specifications are subject to change without notice.

Note: *1

- Capacity is based on the following temperature conditions.

		JIS C9612-1994	
		Cooling	**Heating**
Indoor unit inlet air temperature	(DB)	27°C	20°C
	(WB)	19°C	–
Outdoor unit inlet air temperature	(DB)	35°C	7°C
	(WB)	24°C	6°C

Note: *2 CHARGELESS

- No additional refrigerant required.
- This air conditioner accepts a connection piping length of up to 10m and a head of up to 5m.
- There is no need to add the refrigerant as long as the total length of the connection piping is up to 10m.

2. CONSTRUCTION VIEWS

2-1. Indoor Unit

RAS-07EKH
RAS-09EKH

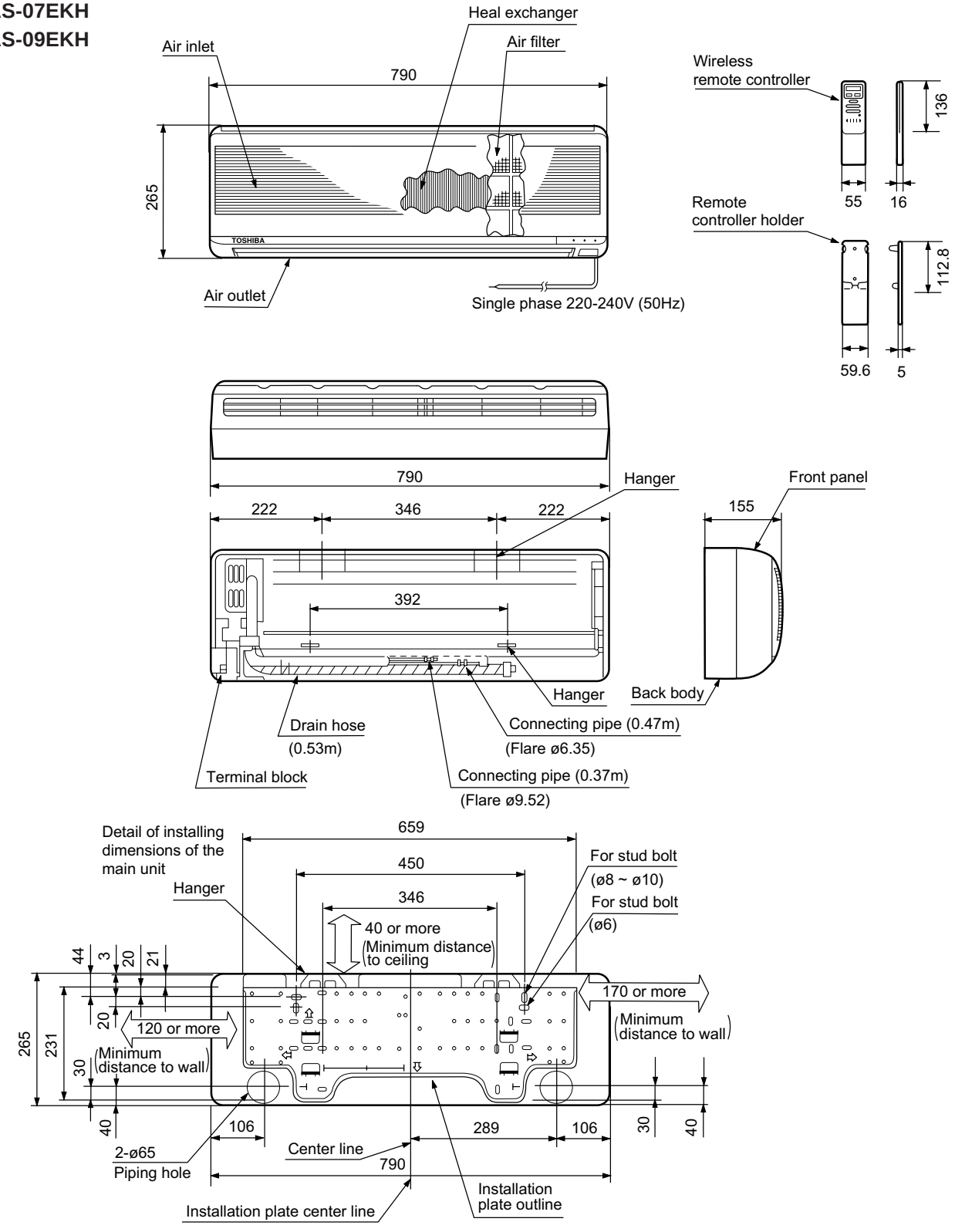


Fig. 2-1

2-2. Outdoor Unit

RAS-07EAH

RAS-09EAH

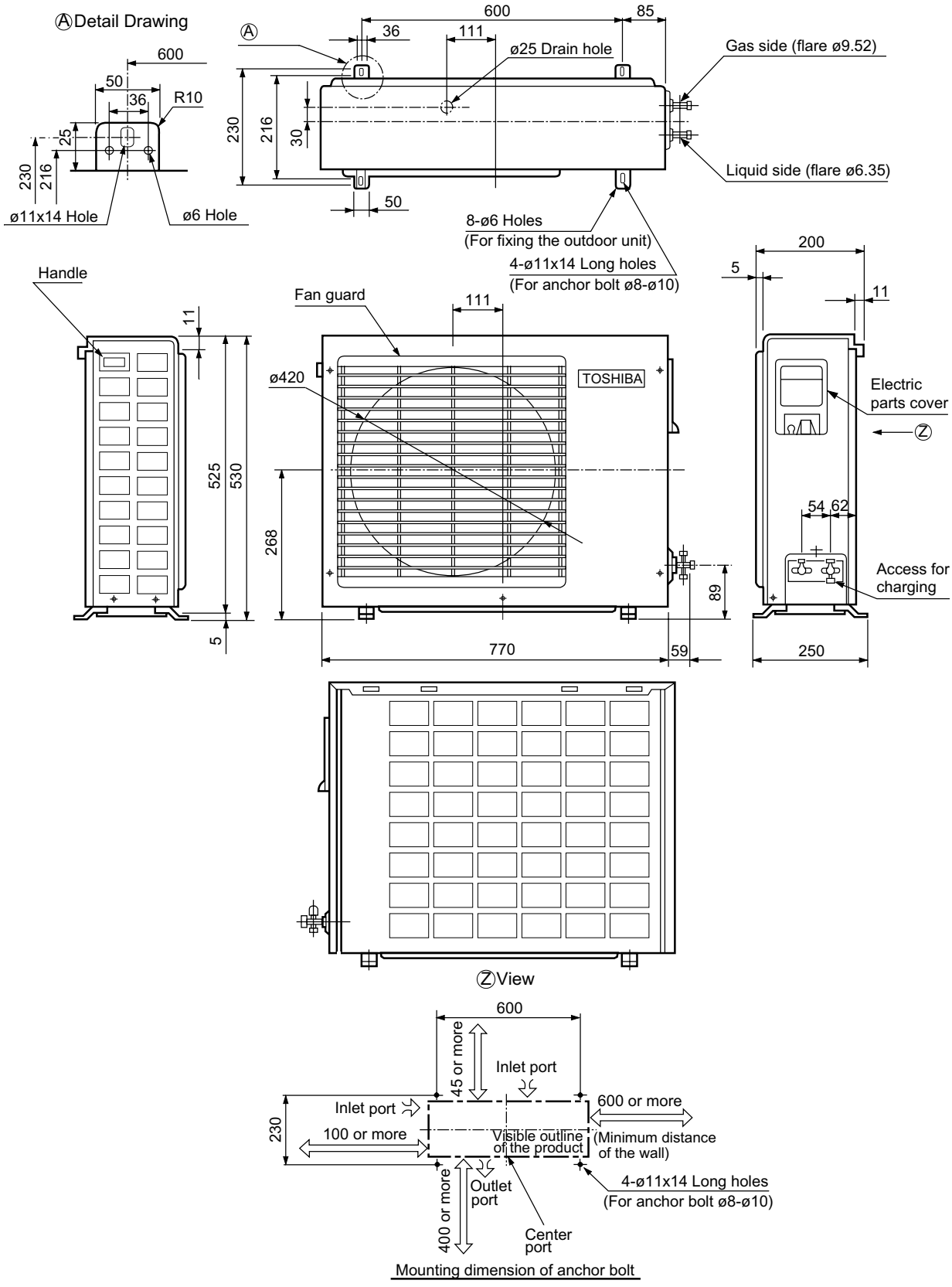


Fig. 2-2

3. CAUTION IN INSTALLATION

3-1. Installation of Indoor Unit

3-1-1. Removing the Front Panel

(1) Open the screw caps and remove the two screws securing the front panel.

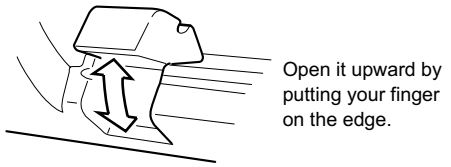


Fig. 3-1 Opening the screw cap

(2) Close the screw caps as behind.

(3) Open the air outlet direction (up-down) louver horizontally by hand.

(4) Slightly open the lower part of the front panel, then pull the upper part of the front panel toward you to remove it from the rear plate.

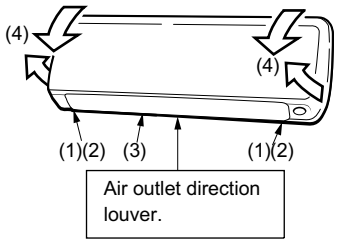


Fig. 3-2 Removing the front panel

Caution When Connecting the Connecting Cable

When connecting the connective cable, follow the instructions below.

(1) Remove the front panel.

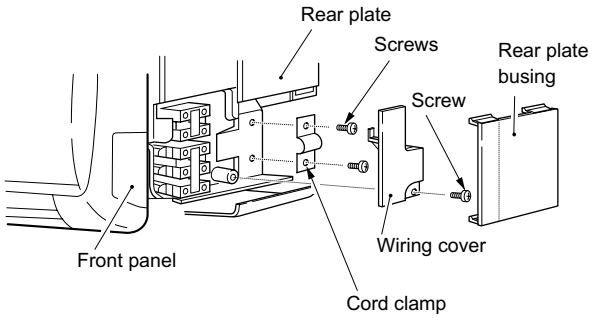


Fig. 3-3

Note:

- Connect the indoor and outdoor units with a connective cable over the shortest distance as possible.

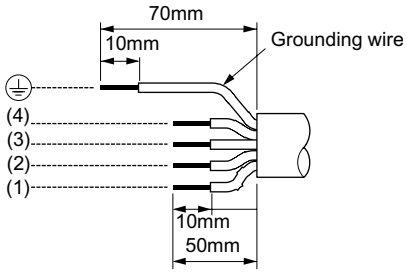


Fig. 3-4

(2) Insert the connective cable fully into the terminal block and secure it by screw tightly.

(3) Secure the connective cable with the cord clamp.

(4) Tightening torque should be 1.2 N.m (12 kgf.cm)

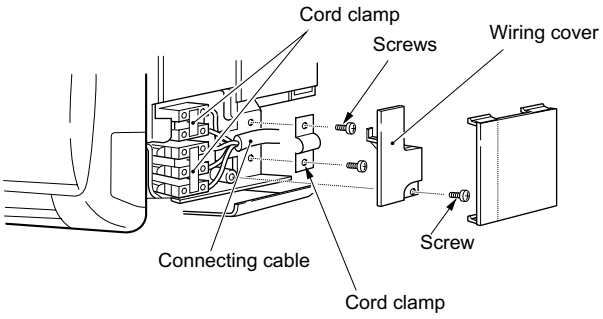


Fig. 3-5

(5) Fix the wiring cover, rear plate bushing and front panel on the indoor unit.

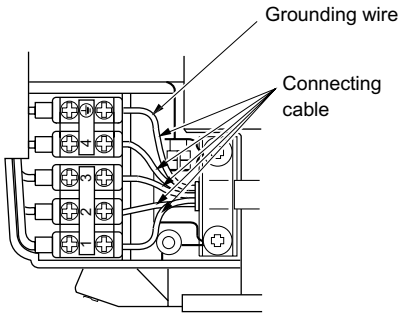


Fig. 3-6

3-1-2. Caution in Mounting the Front Panel

When the panel is removed and mounted again, follow the step described below.

(1) After fastening two screws, be sure to hook the inside clicks (1) and (2) of the front panel shown in Fig. 3-7, right gap is left between the front panel and the rear plate.

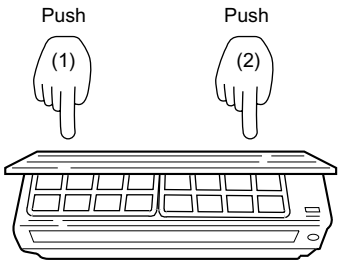


Fig. 3-7

Note:

- If cooling (dry) operation is made without pushing the air outlet, dew can be attached on the front panel surface. In addition, a gap between the front panel and the body will become wider, spoiling the appearance.

3-1-3. Precautions for Refrigerant Piping

(1) Under-side connection with piping

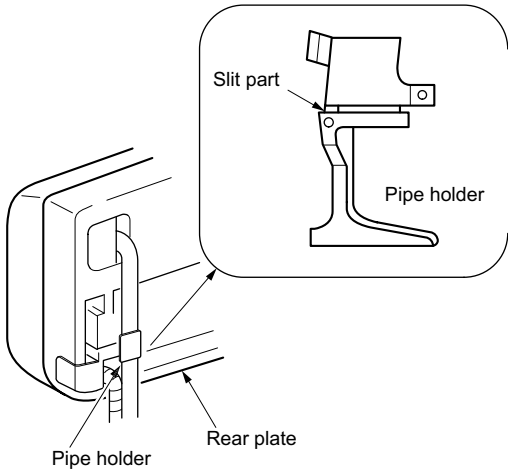


Fig. 3-8

(1) Cut out the knockout piece from the right below of the rear plate with a knife, etc. Smooth the cut edge.

(2) Set the drain hose in the inner part of the indoor unit and connecting cable in lower part of it.

(3) Wind the tape round them.

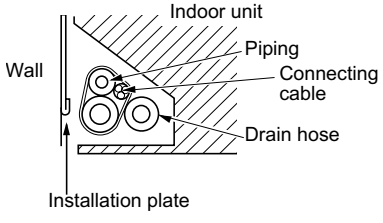


Fig. 3-9

(2) Left-hand connection with piping

When the piping runs to the left, be sure to use a tool such as a pipe bender to bend the pipe.

Note:

- If the pipe is bent incorrectly, the air conditioner could be raised.

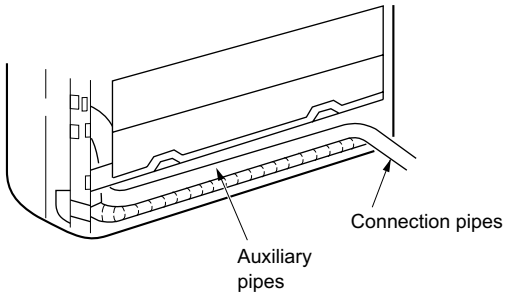


Fig. 3-10

(1) When the piping runs to the left, remove the left side body bushing of the rear panel. You may need the body bushing when you relocate the unit, so be sure make the customer keep it in a safe place.

(2) After passing the connection pipe through the pipe hole, connect the connection pipe to the auxiliary pipes and wrap covering tape around them.

(3) For left-hand connection with piping, bend the pipes as shown in Fig. 3-11.

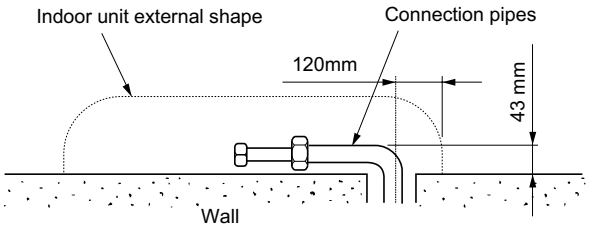


Fig. 3-11

Note:

- Bend the connection pipe so that the distance between the pipe and the wall be 43 mm or less.

3-2. Flaring

3-2-1. Pipe Cutting

(1) Cut the pipe little by little advancing the blade of pipe cutter slowly.

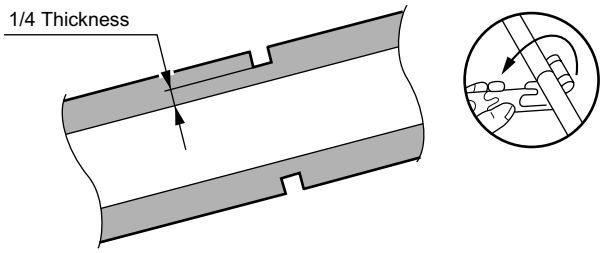


Fig. 3-12

Note:

- For fine work, do not advance the blade by force in order to prevent distortion of the pipe, and extra burrs.
- Cut the pipe a little longer than required.

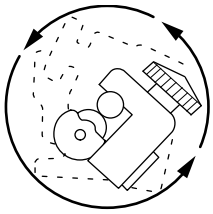


Fig. 3-13

3-2-2. Burr Removal

(1) Raise burrs with the burr stick or the burr remover. (Hold the flaring end down to prevent burrs from dropping inside pipe)

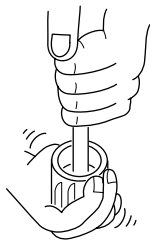


Fig. 3-14

Note:

- Be sure to remove burrs to avoid unevenness on the flare face which will cause gas leaks.
- Cover the pipe end with a polyethylene bag and on sheet.

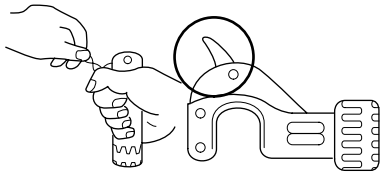


Fig. 3-15

3-2-3. Point of Flaring

(1) The exact length of pipe protruding from the face of the flare die is determined by the flaring, too.

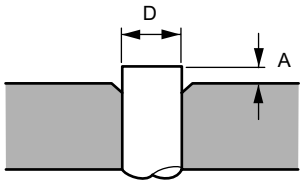


Fig. 3-16

Note:

- Too long a protrusion of pipe from the flaring tool will result in too long a flare; If this happens, the flare nut will not tighten and the joint will not seat.
- Too small a protrusion will cause gas leaks.

CAUTION:

- Too large protrusion of pipe results in impossible tightening of the flare nut.
- Too small a protrusion of pipe will cause gas leaks due to insufficient flare surface.

- Table 3-1 shows the use of an imperial die and a rigid die.

Table 3-1

Type of pipe	D (mm)	A (mm)	
		Imperial	Rigid
1/4”	6.35	1.3	0.7
3/8”	9.52	1.6	1.0

- Fine flaring work shows even brightness on the flared surface and uniform thickness of pipe.
- Unsuccessful flaring work causes gas leaks, therefore rework it.

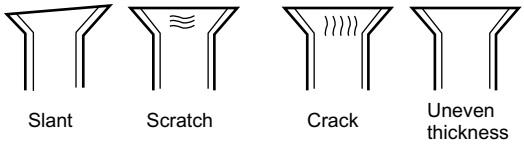


Fig. 3-17

- The above faulty flaring will cause gas leaks.

3-2-4. Finishing Work

(1) Fix the pipe firmly on the flare die. Match the centers of both the flare die and the flaring punch, and tighten flaring punch fully.

3-3. Pipe Process Points

3-3-1. Pipe Bending

(1) Carefully bend by hand.

Note:

- Collapsed pipe cause cooling failure.

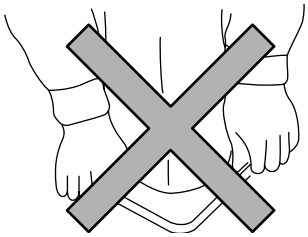


Fig. 3-18

(2) Bend with pipe bender. (Since the insulation is wound on, use the bender by sliding the insulation to one side, or cutting it halfway.)

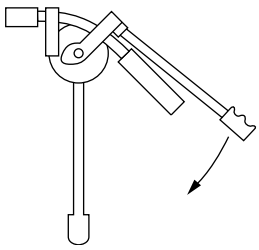


Fig. 3-19

(3) The radius of the pipe bend should be 100 mm or more.

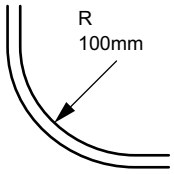


Fig. 3-20

(4) Too small a radius causes collapse of pipe.

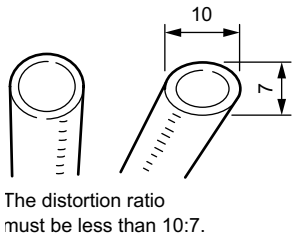


Fig. 3-21

3-3-2. Pipe Connection

(1) Connect the flare pipe close to the air conditioner unit so both faces fit well.

Note:

- Forcing to tighten the nut without the center axis coincided causes gas leaks.

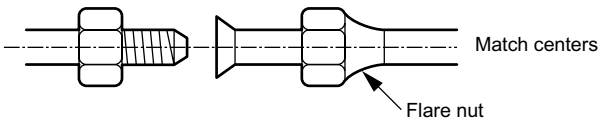


Fig. 3-22

(2) Use a torque wrench and spanner to tighten or untighten the flare nut. Tightening should be done by finger first, then use the torque wrench. A torque wrench helps to provide adequate torque for tightening.

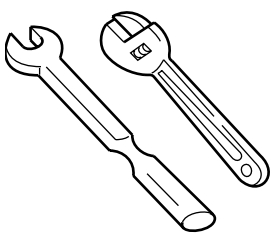


Fig. 3-23

Note:

- Insufficient tightening causes gas leaks. Over tightening results in cracks the flared surface.

CAUTION:

- Do not use the spanner from the beginning of tightening.
- When processing 1/4 inch pipe, tighten lightly with spanner and then tighten additionally by 90 – 120 degree with torque wrench and spanner.

Table 3-2 Tightening torque of flare nut

Pipe size	6.35 mm (1.4")	9.52 mm (3/8")
Standard torque	15.7 (160)	29.4 (300)

(Unit: N.m (kgf.cm))

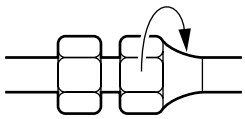


Fig. 3-24

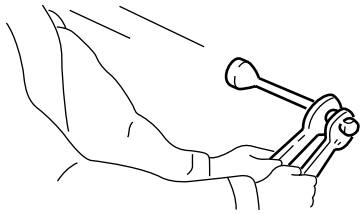


Fig. 3-25

4. WIRING DIAGRAM

RAS-07EKH/RAS-07EAH

RAS-09EKH/RAS-09EAH

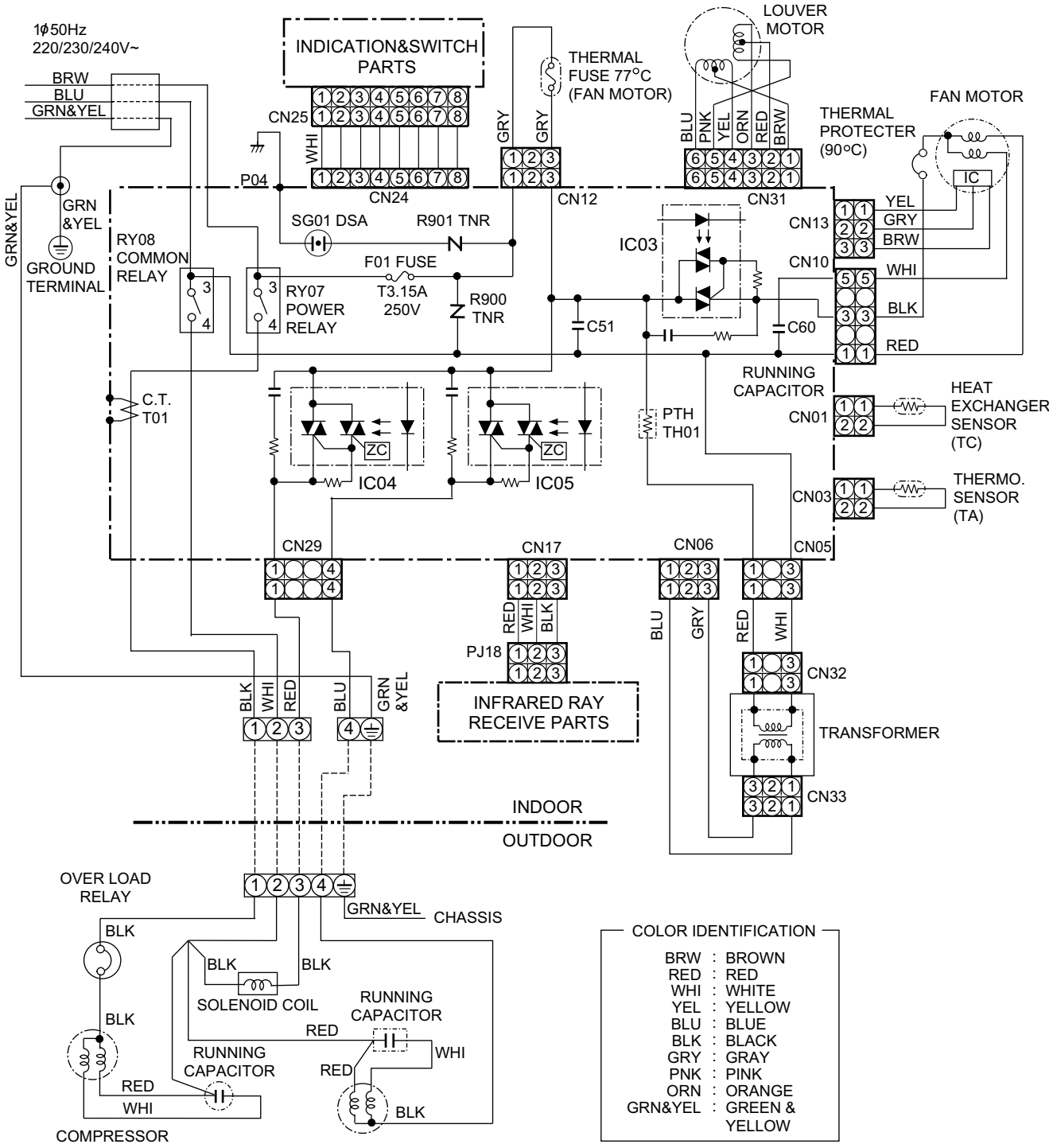


Fig. 4-1

5. SPECIFICATIONS OF ELECTRICAL PARTS

5-1. RAS-07EKH, RAS-09EKH (Indoor Unit)

No.	Parts name	Type	Specifications		
1	Fan motor (For indoor)	MMF-200-18-2C	Output (Rated) 18W, 2 pole, 1 phase, 220 – 240V, 50 Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				101.6	209.4
2	Thermo sensor (TA sensor)	(microporcessor)	Adjustable range: 17 – 30°C		
3	Runing capacitor for indoor fan motor	EVN40M105UL1	400WV, 1μF		
4	Transformer	TTZ-200/240-1	Primary 200 – 240V, Secondary 15V		
5	Microcomputer	TMP87CH40N			
6	Power relay, Common relay	G4A-1A	Coil: 12V 90mA, Rated 250V 20A		
7	Heat exchanger sensor (TC-sensor)	(microprocessor)	10 KΩ at 25 °C		

5-2. RAS-07EAH (Outdoor Unit)

No.	Parts name	Type	Specifications		
1	Compressor	$PH70T_1$-4C	Output (Rated) 500W, 2 pole, 1 phase, 220 – 240V, 50 Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				4.46	6.55
2	Fan motor (For outdoor)	UE6-21A5P	Output (Rated) 18W, 6 pole, 1 phase, 220 – 240V, 50 Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				366.2	368.5
3	Running capacitor (For fan motor)	EEP2G155HQA104	400V AC, 1.5μF		
4	Running capacitor (For compressor)	SK-40CMF15UT	400VAC, 15μF		
5	Solenoid coil	LB60012	AC: 200/240V		
6	Overload relay	J-MRA99259-9201	AC: 200/240V		

5-3. RAS-09EAH (Outdoor Unit)

No.	Parts name	Type	Specifications		
1	Compressor	$PH940T_1$-4C	Output (Rated) 750W, 2 pole, 1 phase, 220 – 240V, 50 Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				4.53	8.73
2	Fan motor (For outdoor)	UE6-21A5P	Output (Rated) 18W, 6 pole, 1 phase, 220 – 240V, 50 Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				366.2	368.5
3	Running capacitor (For fan motor)	EEP2G155HQA104	400V AC, 1.5μF		
4	Running capacitor (For compressor)	EAG40M206UF2	400V AC, 15μF		
5	Solenoid coil	LB60012	AC: 200/240V		
6	Overload relay	J-MRA99260-9200	AC: 200/240V		

6. REFRIGERANT CYCLE DIAGRAM

RAS-07EKH/RAS-07EAH

RAS-09EKH/RAS-09EAH

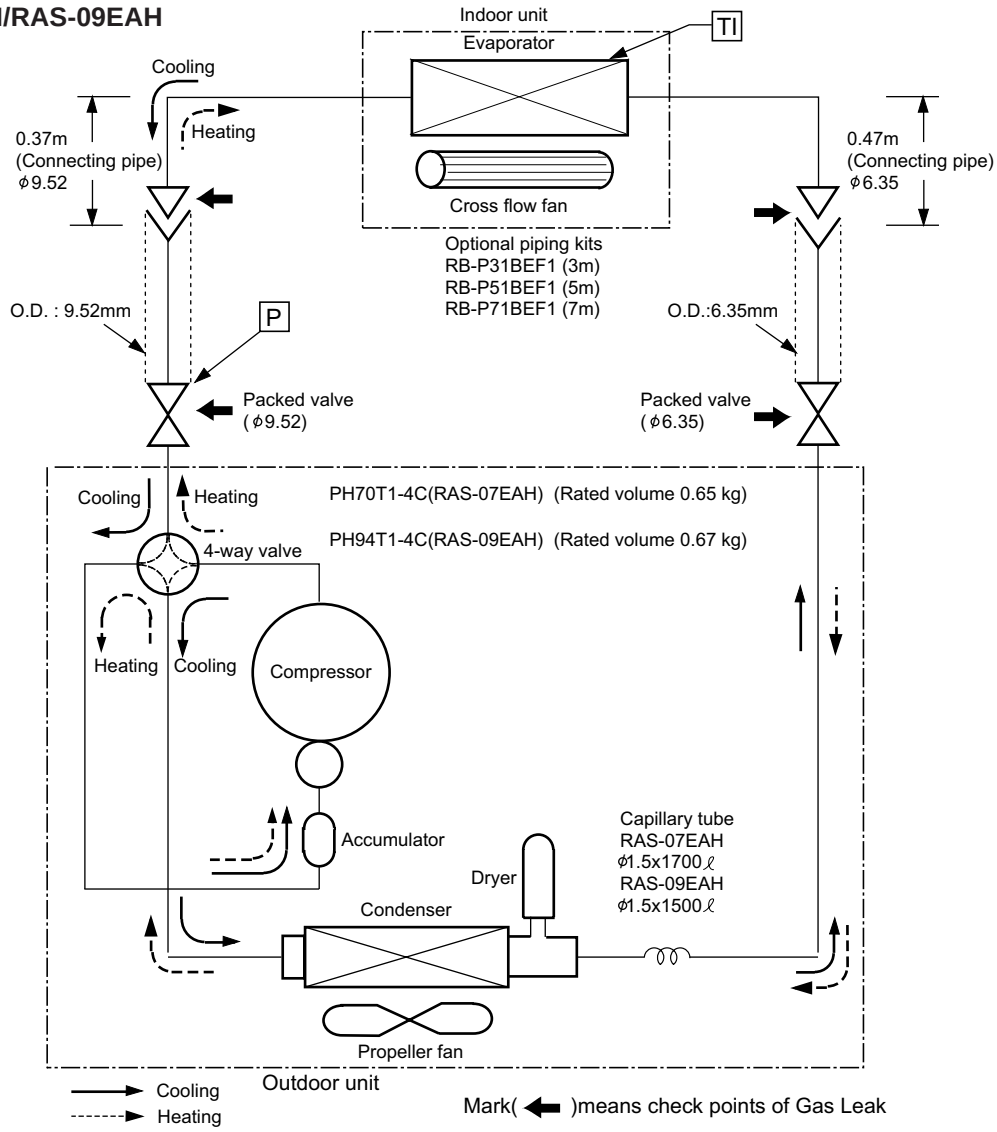


Fig. 6-1

Table 6-1

	50Hz	Standard pressure P (kg/cm²G)		Surface temp. of heat exchanger interchanging pipe T1 (°C)		Fan speed (indoor)	Ambient temp. conditions DB/WB (°C)	
	Model	RAS-07EKH	RAS-09EKH	RAS-07EKH	RAS-09EKH		Indoor	Outdoor
Heating	Standard	12.6	14.2	34.5	38.5	High	20/–	7/6
	High temperature	17.1 ~ 19.9	19.8 ~ 22.8	45.5 ~ 52.0	52.0 ~ 59.0	Low	27/–	21/15
	Low temperature	10.4	11.9	29.5	34.1	High	20/–	–10/–10
Cooling	Standard	6.5	6.2	12.5	11.4	High	27/19	35/24
	High temperature	6.2	6.9	18.5	14.6	High	32/23	43/26
	Low temperature	4.6	4.5	3.0	2.4	Low	21/15	21/15

Note:

- Measure the heat exchanger temperature at the center of U-bend (By means of thermistor thermometer.) During heating overload, the high temperature limit control operation is included.

7. MICRO-COMPUTER BLOCK DIAGRAM

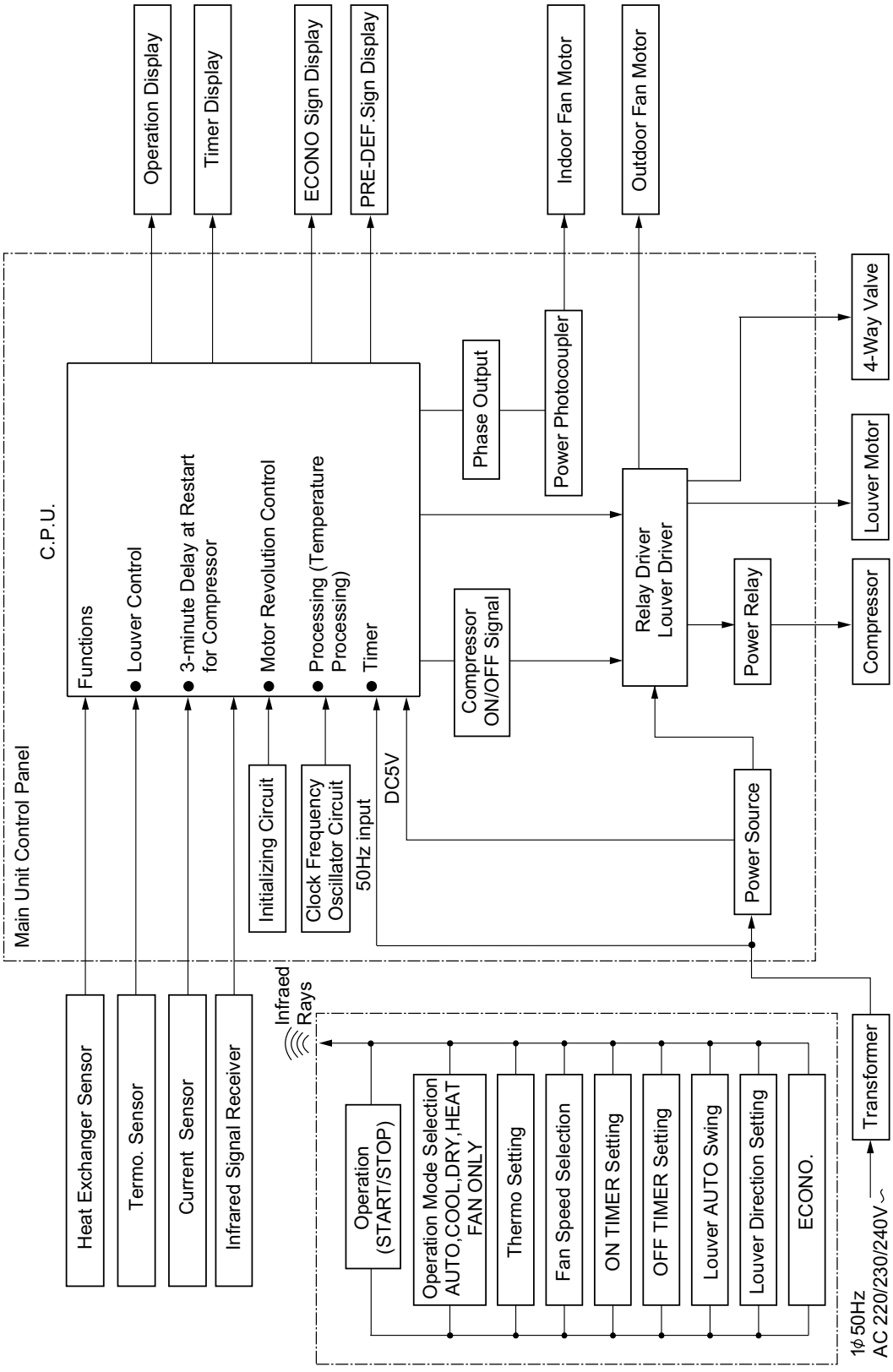


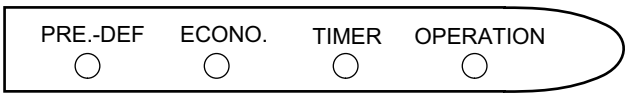
Fig. 7-1

8. OPERATION DESCRIPTIONS

8-1. Names and Functions of Indicators and Controls on Indoor Unit

8-1-1. Display Panel

The operating conditions are indicated below.



- OPERATION lamp (green)
- TIMER lamp (yellow)
- ECONO. lamp (green)
- PRE.-DEF lamp (red)

Fig. 8-1

8-1-2. Control Panel

Lift the front panel to perform control panel setting.

(1) Opening the front panel

1) Push the PUSH on both lower corners of the front panel.
2) Open the panel. You can lift the panel up to an angle where it will remain fixed.

   Do not lift the panel any further when it stops with a clicking sound.

(2) Closing the front panel

1) Push the PUSH on both lower ends of the front panel.
2) Close the panel firmly.

(3) If the TEMPORARY switch is set to AUTO

1) The air conditioner operates automatically by selecting the cooling, dry, fan only mode depending on the room temperature.

(4) If the TEMPORARY switch is set to COOL

1) The air conditioner operates in the cooling mode (at a low fan speed).

Note:

- If the TEMPORARY switch is set to AUTO or COOL, the remote controller is not usable.

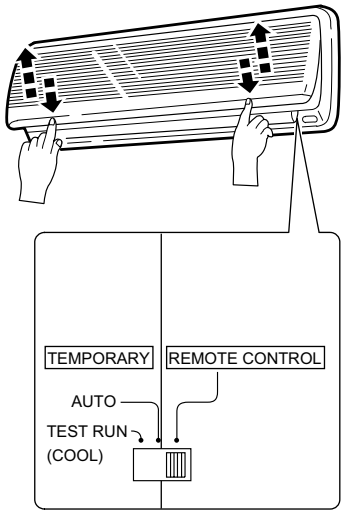


Fig. 8-2

8-2. Functions on Remote Controller

(a) Infrared signal emitter

Transmits a signal to the indoor unit.

(b) START/STOP button

- Push the button to start operation. (A receiving beep is heard.)
- Push the button again to stop operation. (A receiving beep is heard.)
- If no receiving sound is heard from the indoor unit, push the button twice.

(c) Mode select button (MODE)

Push this button to select modes. Each time you push the button, a mode is selected in a sequence that goes from AUTO, COOL, DRY, HEAT, FAN ONLY, and back to AUTO. (A receiving beep is heard).

(d) Temperature button (TEMP.)

▲ The set temperature is increased to 30°C.
▼ The set temperature is decreased to 17°C.
(A receiving beep is heard.)

(e) Fan speed button (FAN)

- Push this button to select fan speed.
- When you select AUTO, the fan speed is automatically adjusted according to the room temperature. You can also manually select the desired fan speed from three settings. (A receiving beep is heard.)

(f) Auto louver button (AUTO)

- Push this button to swing the louver. (A receiving beep is heard.)
- Push this button again to stop louver swinging. (A receiving beep is heard.)

(g) Set louver button (SET)

- To adjust the air flow direction by the wireless REMOTE CONTROLLER during the air conditioner operation, push this button. (A receiving beep is heard.)
- While this button is kept depressed, the receiving tone continuously sounds.

(h) Off timer button (OFF)

- Push this button to set the OFF timer.

(i) On timer button (ON)

- Push this button to set the ON timer.

(j) Reserve button (RSV)

- Push this button to reserve timer settings. (A receiving beep is heard.)

(k) Cancel button (CNL)

- Push this button to cancel on timer and off timer. (A receiving beep is heard.)

(l) Economy button (ECONO.)

- Push this button to set the economical operation mode of the air conditioner. (A receiving beep is heard.)

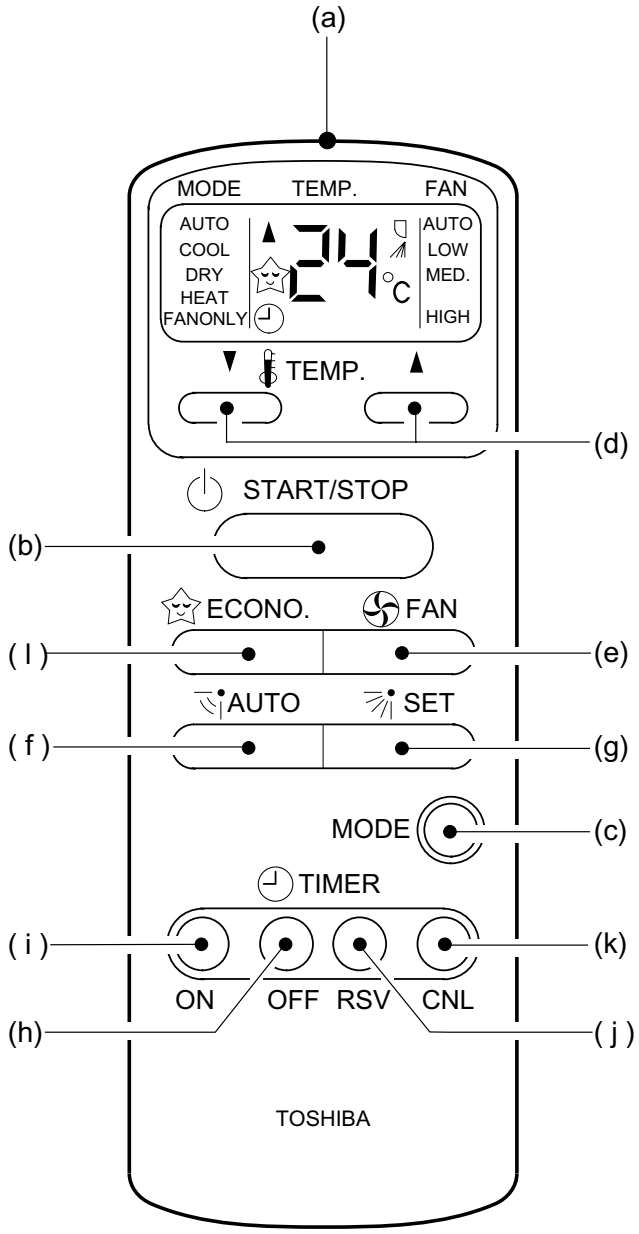


Fig. 8-3

8-3. Names and Functions of Indicators on Remote Controller

(a) Transmission indicator

- This transmission indicator lights when remote controller transmits signals to the indoor unit.

(b) ON/OFF display

- Displayed by pushing the START/STOP button.
- Push the START/STOP button again to disappear.

(c) MODE display

- Displays the current operation mode.

(d) TEMP. display

- Displays the temperature setting (17°C to 30°C)
- When you set the operating mode to FAN ONLY, no temperature setting is displayed.

(e) ECONO. display

- Displayed by pushing the ECONO. button.
- Push the ECONO. button again to disappear.

(r) FAN speed display

- Displays the selected fan speed. AUTO and three fan speed levels “LOW”, “MED”, “HIGH” can be indicated.
- Displays AUTO when the operating mode is either AUTO or DRY.

(g) TIMER display

The time set for timer operation is indicated.

Note:

- In Fig. 8-4, all displays are indicated for the sake of clarity. During operation, only the relevant displays will be shown on the remote controller.

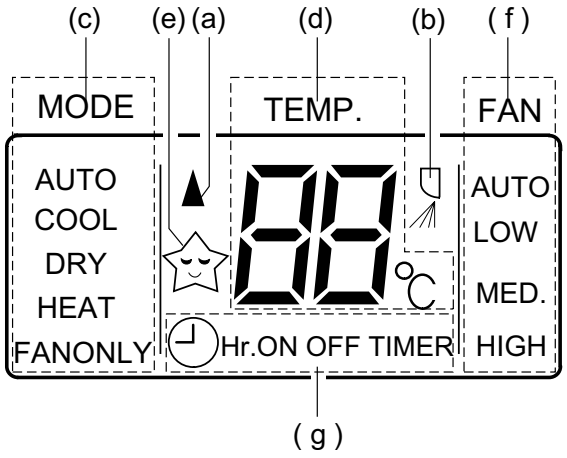


Fig. 8-4

8-4. Handling the Remote Controller

8-4-1. Location of the Remote Controller

Keep the remote controller where its signals can reach the receiver of the air conditioner (a distance of 7m is allowed.)

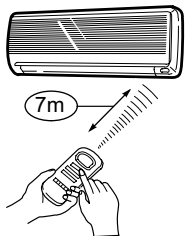


Fig. 8-5

8-4-2. Remote Controller Mounting Fixture

A mounting fixture for the remote controller is supplied with it.

(1) Installing the mounting fixture

Before you actually install the mounting fixture on a wall or the pillar, check whether the remote control unit signals from the location where you will install the fixture can be received by the indoor unit.

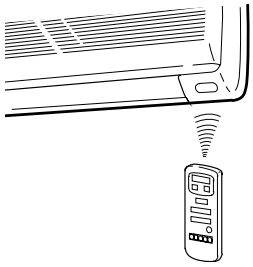


Fig. 8-6

(2) Mounting and removing the remote controller

To mount, hold the remote controller parallel to the mounting fixture and push it in fully. To remove, slide the remote controller upwards and out from the mounting fixture.

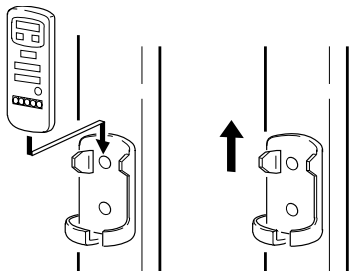


Fig. 8-7

8-4-3. Replacing Batteries

The remote controller uses two alkaline dry batteries (LR03).

(1) Remove the cover of the battery compartment at the back of the remote controller by sliding it out in the direction of the arrow.

Remove the used batteries and insert new batteries.

(2) Press a coin or the similar object against the unit to reset, and perform resetting. Then, close the rear lid.

(Once the cell has been replaced, the controller may malfunction. Perform resetting (ACL) accordingly.)

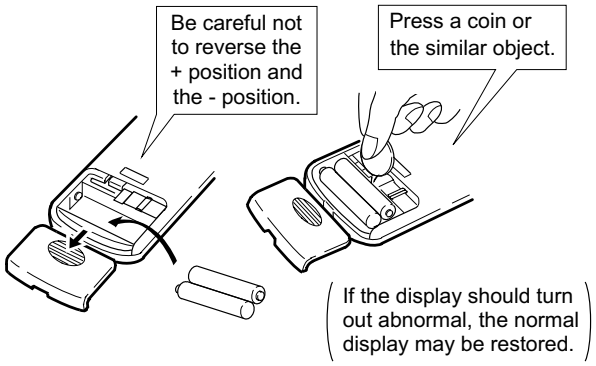

Be careful not to reverse the + position and the - position.
Press a coin or the similar object.
If the display should turn out abnormal, the normal display may be restored.

Fig. 8-8

Notes:

- When replacing batteries, do not use used batteries or batteries of a different type. Such use may cause the remote controller to malfunction.
- If you do not use the remote controller over a long period, remove the batteries. Otherwise, battery leakage may damage the remote controller.
- The average battery life during normal use is approximately one year.
- Replace the batteries when there is no receiving beep from the indoor unit or if the transmission indication lamp on the remote control unit fails to light.

CAUTIONS:

- The air conditioner will not operate if curtains doors or other materials block the signal from the remote controller to the indoor unit.
- Prevent any liquid from failing into the remote controller.

  Do not expose the remote controller to direct sunlight or heat.
- If the infrared signal receiver at the indoor unit is exposed to direct sunlight, the air conditioner may not function properly. Use curtains to prevent the sunlight from falling on the receiver.
- If the room using the air conditioner has fluorescent lighting with electronic starters, signals may not be properly received. If you are planning to use such florescent lamps, consult your local dealer.
- If other electrical appliances react to the remote control, either move these appliances or consult your local dealer.

OPERATING MODE:

Once you select the operating mode, the operating conditions are saved in the unit's microcomputer memory.

Thereafter, the air conditioner will start operating under the same conditions when you simply push the START/STOP button of the remote controller.

8-5. Automatic Operation

When you set the air conditioner in AUTO mode, it will automatically select cooling, or fan only operation depending on the room temperature.

8-5-1. Operation Steps

Start

- The OPERATION lamp (green) on the display panel of the indoor unit starts flashing.

(1) Mode button

- Select AUTO.

(2) TEMP. button

- Push the TEMP. button.
- Normally, set it between 21°C to 28°C.

(3) START/STOP button

- Push this button to start the air conditioner.
- The OPERATION lamp (green) on the display panel of the indoor unit lights. The operating mode is selected in accordance with the room temperature and operation starts after approximately 3 minutes.

Stop: START/STOP button

- Push this button again to stop the air conditioner.

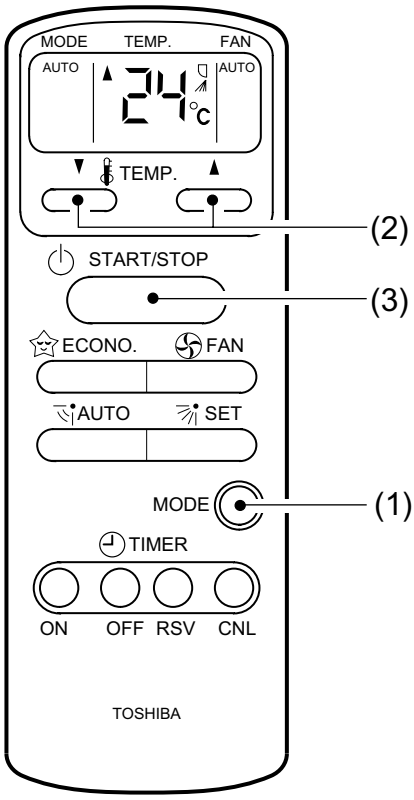


Fig. 8-9

Note:

- If the AUTO mode is uncomfortable, you can select the desired conditions manually.
- When you select the AUTO mode, you do not have to set the fan speed. The FAN speed display will show AUTO and the fan speed will be automatically controlled.

Table 8-1

Room temperature of operation	Operating conditions	
The set temperature +1°C or higher (when hot)	Cooling operation	Performs the cooling operation at a temperature 1°C higher than the setting.
The set temperature –1°C to +1°C	Fan only operation	Performs the fan only oepration (low speed) while monitoring the room temperature. When the room temperature changes, the air conditioner will select the cooling or heating mode.
The set temperature –1°C or lower (when cool)	Heating operation	Performs the heating operation at a temperature 1°C lower than the setting.

8-6. Heating/Cooling/Fan Only Operation

8-6-1. Operation Steps

Start

- The OPERATION lamp (green) on the display panel of the indoor unit starts flashing.

(1) Mode button

- Select HEAT, COOL or FAN ONLY.

(2) TEMP. button

- Push the TEMP. button.
- Cooling 21°C or higher.

(3) FAN button

- Select any of the “AUTO”, “LOW”, “MED” and “HIGH”.

(4) START/STOP button

- Push this button again to stop the air conditioner.
- The OPERATION lamp (green) on the display panel of the indoor unit lights. The operating mode is selected in accordance with the room temperature and operation starts after approximately 3 minutes. (If you select FAN ONLY mode, the unit will start immediately.)

Stop: START/STOP button

- Push this button again to stop the air conditioner.

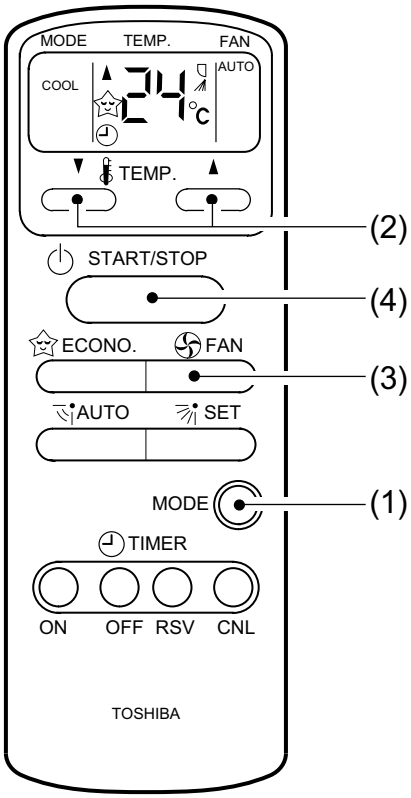


Fig. 8-10

Note:

- The FAN ONLY mode does not control temperature. Therefore, perform only steps (1), (3) and (4) to select this mode.

8-7. Dry Operation

8-7-1. Operation Steps

Start

- The OPERATION lamp (green) on the display panel of the indoor unit starts flashing.

(1) Mode button

- Select DRY.

(2) TEMP. button

- Push the TEMP. button.
- The fan speed indicator displays AUTO.
- The indoor fan speed will be automatically selected low.

(4) START/STOP button

- Push this button again to stop the air conditioner.
- The OPERATION lamp (green) on the display panel of the indoor unit lights, and operation starts after approximately 3 minutes.

Stop: START/STOP button

- Push this button again to stop the air conditioner.

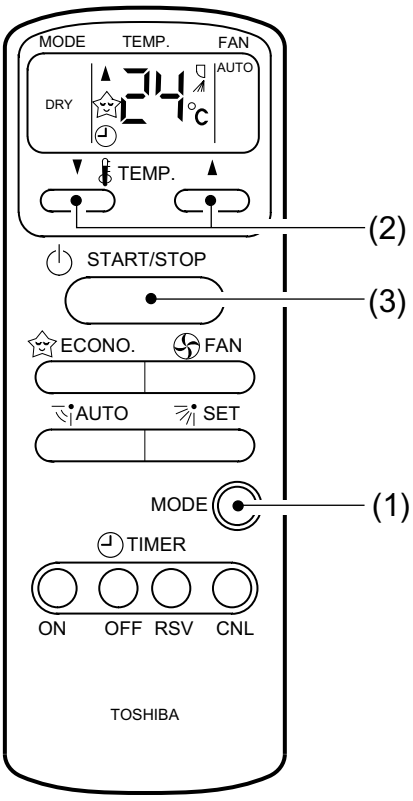


Fig. 8-11

8-8. Timer Operation

8-8-1. Operation Steps

The timer-reserved time indicates the time remaining available. The time indicated on the remote controller changes accordingly.

(1) ON or OFF TIMER button

- Push the ON or OFF TIMER buttons as required.
- Each time the button is pressed, the timer setting changes and set time flashes.
- The indication changes as follows: 0.5 → 1.0 → 1.5 → 2.0 → 3.0 → ... → 23 → 24 Hr.

(2) Reserve button (RSV)

- Push this button. Check that the TIMER lamp (yellow) on the display panel of the indoor unit is lit.
- Push the button once more and you will be able to confirm the available remaining time in the timer.

(3) Cancel button (CNL)

- Push the CNL button to cancel the timer setting.

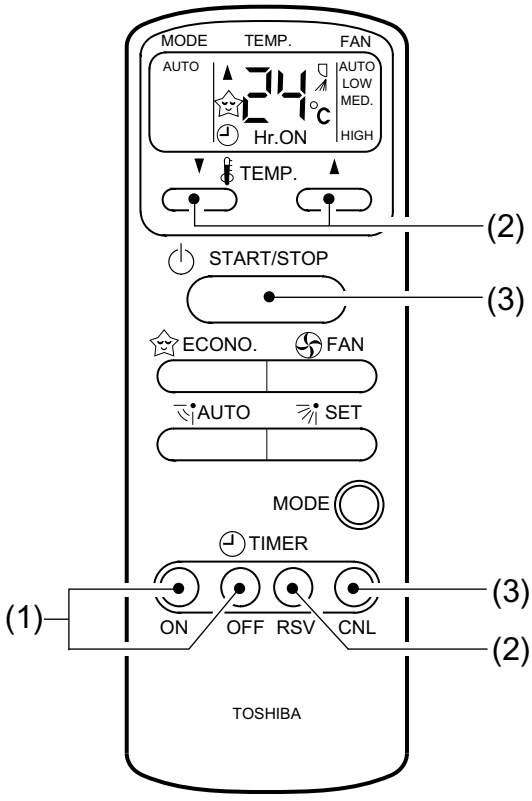


Fig. 8-12

CAUTION:

When you select the timer operation, the remote controller automatically transmits the timer signal to the indoor unit at the specified time. Therefore, keep the remote controller in a location from which it can transmit the signal to the indoor unit properly.

Changing

- Push the ON or OFF TIMER button once.
- The indication of set time will start flashing.
- Perform steps (1) and (2) to change the setting.

8-8-2. Example of Timer Setting

(1) OFF TIMER (Operation → Stop)

The OFF TIMER feature is useful when you go to sleep. The air conditioner will stop automatically at the time set.

Example:

To turn off the air conditioner 7 hours later.

1) Continue pushing the "OFF" TIMER button until you get "7.0".
2) Push the RSV button.

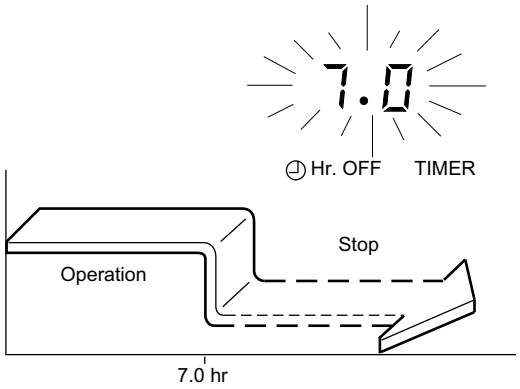


Fig. 8-13

(2) ON TIMER (Stop ∅ Operation)

The ON TIMER feature is useful when you wake up in the morning or when you return home. The air conditioner will automatically start operating at the time set.

Example:

To turn on the air conditioner 5 hours later.

1) Continue pushing the "ON" TIMER button until you get "5.0".
2) Push the RSV button.

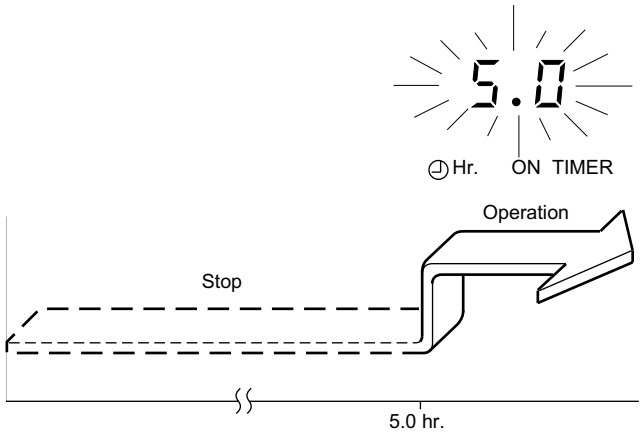


Fig. 8-14

8-9. ADJUSTING AIR FLOW DIRECTION

8-9-1. Adjustment of Vertical Air Flow Direction

(1) When using the wireless auto louver, the air flow direction is automatically set to the desired position of the last time adjusted during operation.

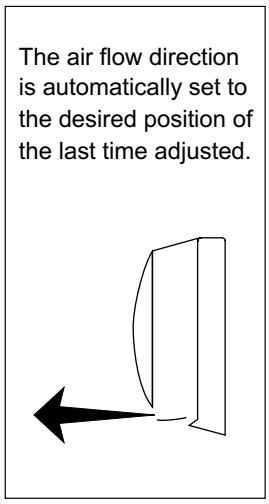


Fig. 8-15

(2) When you stop operation using the remote controller, the louver is closed.

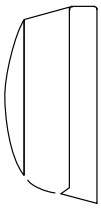


Fig. 8-16

(3) When setting the air flow direction to your preference, hold down the SET LOUVER button of the remote controller and set the air flow in the direction you desire.

(4) During cool and dry operation, change the air flow direction within the range indicated.

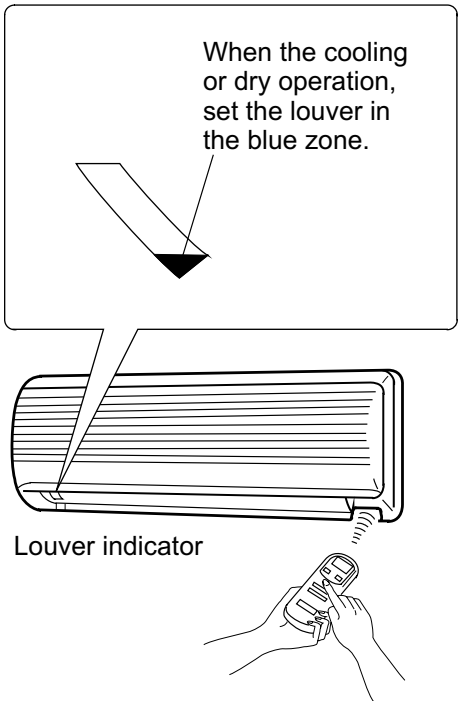


Fig. 8-17

Note:

- In the Cool or Dry operation, remember not to continue the downward air flowing for a long time to avoid conceivable dewing on the louver surface and resultant dripping trouble.
- It is also possible to adjust the air flow direction by the remote controller even when the wireless auto louver is in use, but once the air conditioner operation was stopped and restarted thereafter, the air flowing direction automatically becomes horizontal.
- The air flow cannot be adjusted with the remote controller when the air conditioner is stopped. (Also when the ON TIMER is indicated on the display.)

8-9-2. Adjusting the Horizontal Air Flow Direction

Preparation:

For the cooling or dry operation, move the vertical air flow louver downward using the SET button on the remote controller.

(1) Take hold of the lever on the horizontal air flow grilles and move them to adjust the air flow direction as required.

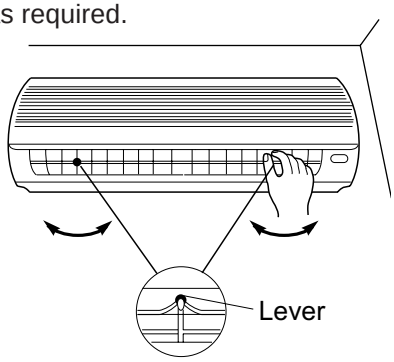


Fig. 8-18

(2) You can adjust the air flow at the left, right locations of the grilles.

(3) For the cooling or dry operation, return the vertical air flow louver to the original position using the SET button on the remote controller.

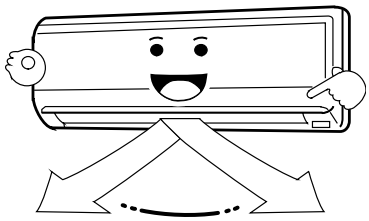


Fig. 8-19

8-9-3. Adjusting the Automatic Swing Air Flow Direction

Perform this function while the air conditioner is in operation.

(1) Push the AUTO button on the remote controller.

(2) To stop the function, push the AUTO button again.

(3) To change the swing direction, push the SET button.

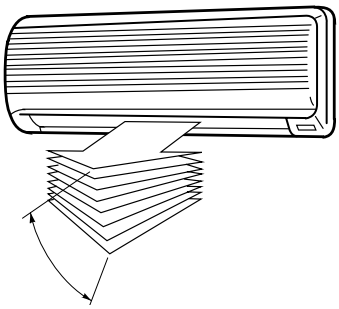


Fig. 8-20

CAUTIONS:

- The SET and AUTO buttons will be disabled when the air conditioner is not in operation (including when the ON TIMER is set).
- Do not operate the air conditioner for long hours with the air flow direction set downward during the cooling or dry operation. Otherwise, condensation may occur on the surface of the vertical louver and cause dew dripping.
- Do not move the vertical louver manually. Always use the SET button. If you move the louver manually, it may malfunction during operation. If the louver malfunctions, stop the air conditioner once, and restart.
- When the air conditioner is started immediately after it was stopped, the vertical louver might not move for 10 seconds or so.
- The angle of the two vertical louvers may differ when they move downward and upward.

PREPARATION:

- When the power plug (or cord) is connected to EKH: AC 220/230/240V (50 Hz) outlet, the OPERATION (ON) lamp starts flashing, indicating that power has been turned on (or that power failure occurred).
- Confirm that the remote control TEMPORARY switch is set to the REMOTE CONTROL position.
- When the remote controller's START/STOP button is pushed, a receive tone is heard from the main unit and the following operations are carried out.

8-10. FAN ONLY Operation

(The remote controller's MODE button is set to the FAN ONLY position.)

(1) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button.

(2) When the FAN SPEED button is set to the AUTO position, the indoor fan motor operates as shown in Fig. 8-21. When the FAN SPEED button is set to LOW, MED, or HIGH, the motor operates with a constant air volume as listed in Table 8-2. Power relay RY7 is turned off.

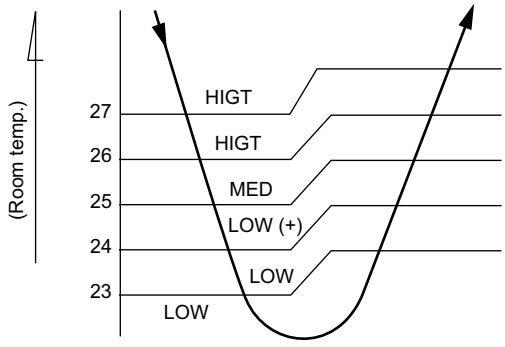


Fig. 8-21 Auto setting of air volume

Table 8-2 Manual setting of FAN SPEED

Indication of FAN SPEED	Air volume
LOW	LOW
MED	MED
HIGH	HIGH

8-11. COOL Operation

(The remote controller's MODE button is set to the COOL position)

(1) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button.

(2) Relay RY07, RY08 is turned on to energize the outdoor unit, and a cool operation is carried out. The indoor fan motor operates as shown in Fig. 8-22 when FAN SPEED button is set to AUTO. The motor operates with a constant air volume as listed in Table 8-2, when the FAN SPEED button is set to LOW, MED, or HIGH.

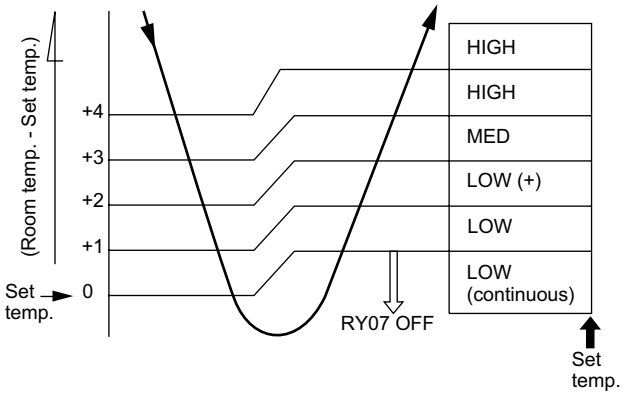


Fig. 8-22 AUTO

8-11-1. Louver control

(1) When the SET LOUVER button of the remote controller is pushed during the operation, the louver is automatically set to the desired position.

(2) When the SET button is pushed, the louver vertically swings within range of 25°.

(3) The louver position is stored in the microcomputer, and at the next operation, the louvers will be set to the position automatically.

8-12. HEAT Operation

(The remote control MODE button is set to the Heat position.)

(1) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button.

(2) Relay RY07, RY08 are turned on to energize the outdoor unit, and a heat operation is carried out. The indoor fan motor operates as shown in Fig. 8-23, when FAN SPEED button is set to AUTO. The motor operates with a constant air volume as listed in table 8-2, when the FAN SPEED button is set to LOW, MED, or HIGH.

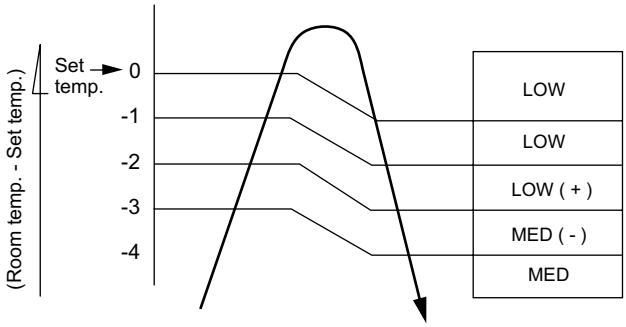


Fig. 8-23

8-12-1. Louver Control

(1) When the SET LOUVER button of the remote controller is pushed during the operation, the louver is automatically set to the desired position.

(2) When the SET LOUVER button is pushed, the louver vertically swings within range of 25°.

(3) The louver position is stored in the microcomputer, and at the next operation, the louvers will be set to the stored position automatically.

(4) When a temperature setting is changed during the heating operation, or when the room temperature becomes close to the temperature setting, the vertical louver might close once and then open again.

8-12-2. Cool Air Flow Control

(1) If the indoor heat-exchanger temperature detected by the indoor heat-exchanger sensor is 20°C or below, the indoor fan stops and if the temperature rises to 32°C or above, the fan is restarted.

8-13. ECONO. Mode

(The remote controller's ECONO. button is pushed and ECONO. display is lit.)

(1) When the ECONO. button is pushed, the indoor unit operates quietly and mildly with controlling airflow.

(2) In the ECONO. mode, the indoor unit will operate at set temperature for one hour from starting time, and next 1 hour, operate at temperature adding 1°C to set temperature, and then at temperature adding 2°C to set temperature since 2 ours ago.

(3) The airflow fan will operate in the Low position.

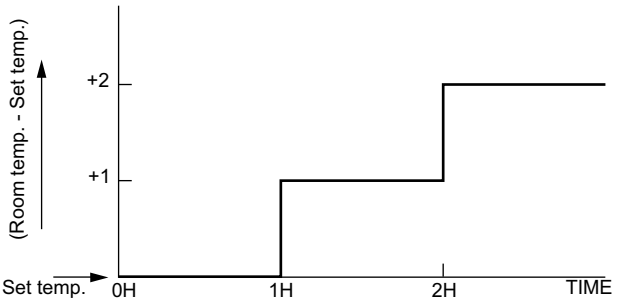


Fig. 8-24

(4) In the ECONO. mode, the indoor unit will operate at set temperature for one hour from starting time, and next 1 hour, operate at temperature lowering 1°C to set temperature, and then at temperature lowering 2°C to set temperature since 2 ours ago.

(5) The airflow fan will operate in the Low position.

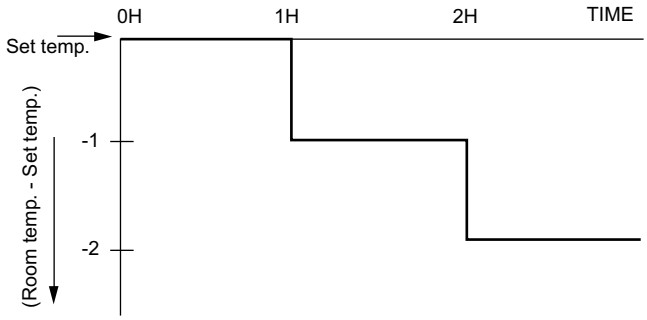


Fig. 8-25

8-14. DRY Operation

(The remote controller's MODE button is set to the DRY position.)

(1) In this mode, a microprocessor control lowers humidity while maintaining a constant temperature.

(2) The microprocessor turns the compressor on and off at regular intervals (4 to 6 minutes on and/or off). During the compressor off, the airflow fan will operate in the ultra low position.

(3) The compressor and airflow fan will operate independent of the temperature control, though the pattern of operation depends on the relation between room temperature (T_A) and set temperature (T_S), as shown below:

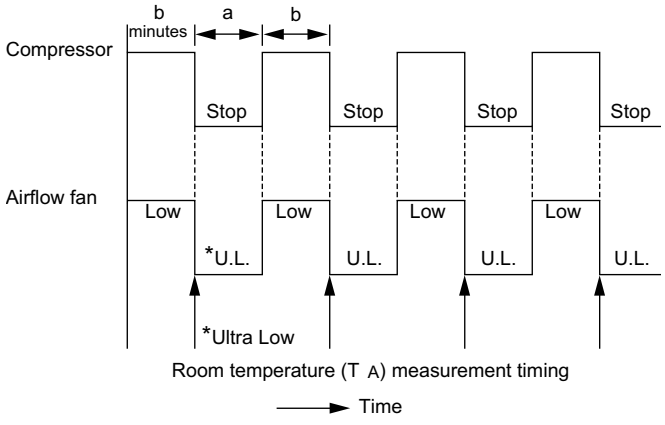


Fig. 8-26

Table 8-3

Relation between room temp. (T_A) and set temp. (T_S)	OFF period a	ON period b
$T_A > T_S + 2$	4 min.	6 min.
$T_S + 2 > T_A > T_S$	5 min.	5 min.
$T_S > T_A$	6 min.	4 min.

- The airflow fan will operate in the Low position, independent of the position of the airflow setting control.

8-15. AUTO Operation

(The remote controller's MODE button is set to the AUTO position and AUTO display is lit.)

(1) One of the 3 modes, Cooling, Fan only and Heating is selected according to room temperature at which operation is to start, as shown in Fig. 8-27. The Fan mode will continue until room temperature reaches a level at which another mode is selected.

8-15-1. Temporary Auto

When the TEMPORARY switch is set to AUTO., the set temperature is fixed at 24°C and controlled in accordance with the chart shown in Fig. 8-27.

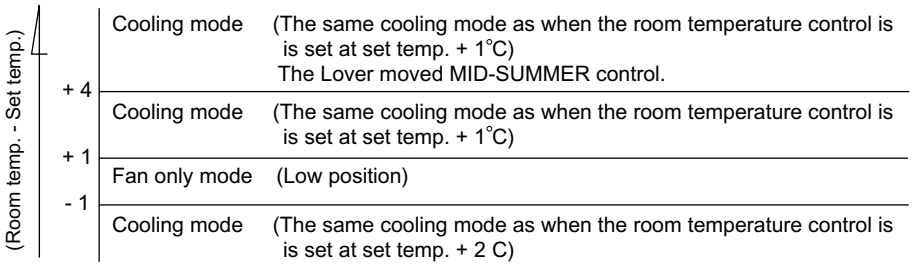

(Room temp. - Set temp.)
+ 4
+ 1
- 1
Cooling mode (The same cooling mode as when the room temperature control is is set at set temp. + 1°C)
The Lover moved MID-SUMMER control.
Cooling mode (The same cooling mode as when the room temperature control is is set at set temp. + 1°C)
Fan only mode (Low position)
Cooling mode (The same cooling mode as when the room temperature control is is set at set temp. + 2 C)

Fig. 8-27

Note:

- Operation is controlled at temperature above, independent on the position of the room temperature control.

8-15-2. Current Limit Control and High-temperature Limit Control (during Heating)

When the load increases (overload) or the line voltage drops during operation of the air conditioner, the operating current increases, and when the power capacity is exceeded, the circuit breaker is activated. This control is performed automatically when the current (heat exchanger temperature) exceeds a certain value so that it is decreased automatically to prevent overload to the supply. Control is performed as described in (1) and (2).

(1) Current limit control'

Control is performed as shown below by detecting the compressor operation current with a current sensor.

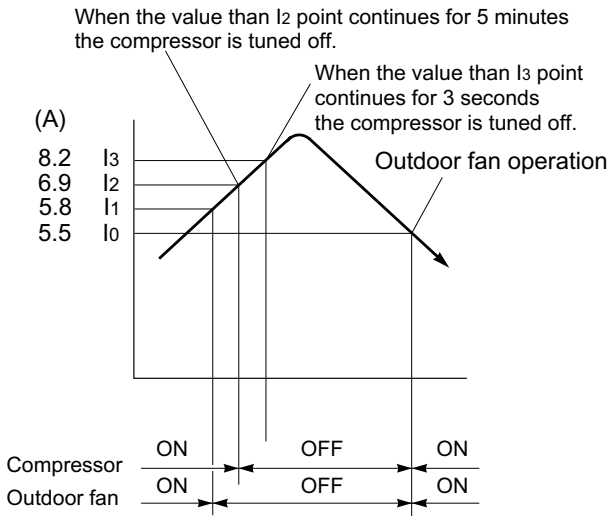


Fig. 8-28

(2) High-temperature limit control

Control is performed as shown in Fig. 8-29 by detecting the heat exchanger temperature with a heat exchanger sensor (TC).

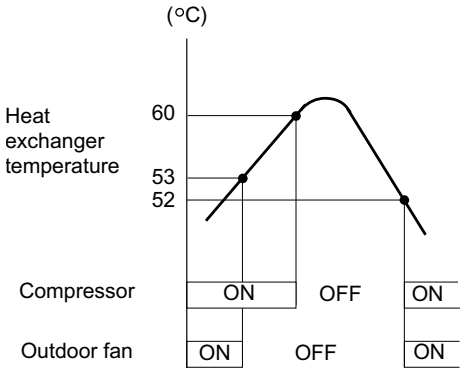


Fig. 8-29

8-16. Cool Airflow Prevention Control

(1) When control is performed with a thermostat, and the thermostat is set to off, the indoor fan stops operating, and restarts at the ultra low speed after 2 minutes and 20 seconds.

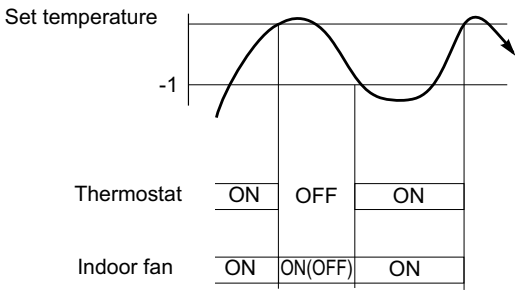


Fig. 8-30

(2) When the heat operation starts, the indoor fan is kept off until the indoor heat exchanger temperature reaches a set temperature.

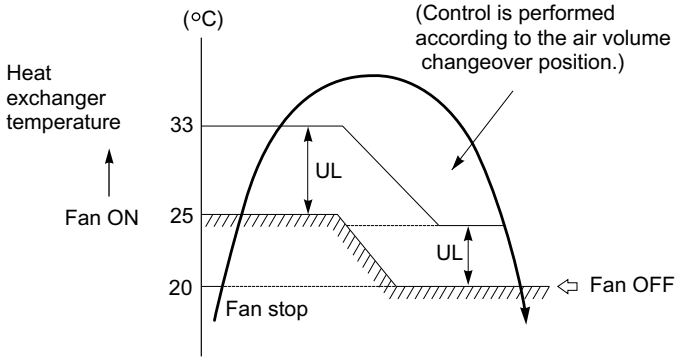


Fig. 8-31

(3) As soon as the defrost operation starts, the indoor fan stops.

8-17. Defrost Operation

8-17-1. Condition to Start the Defrost Operation

Defrost operation starts when the elapsed time is longer than 40 to 90 minutes, whichever specified.

Note:

- When the high-temperature limit control operation (with the outdoor fan OFF) is performed for a total of 90 minutes, defrost operation starts and continues for 10 minutes.

  The cumulative operation time is cleared only when the defrost operation is completed.

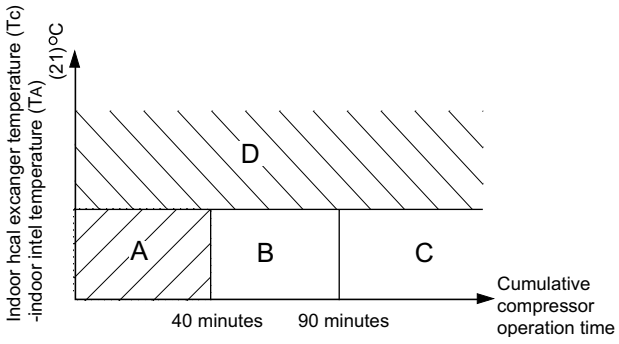


Fig. 8-32

8-17-2. Defrost Operation Time Control

(1) The heating operation is performed for at least 40 minutes.

(2) The maximum defrost operation time is 6 minutes. The defrost operation time for the 4th cycle is 10 minutes. (When the outdoor temperature is very lower, however, the defrost operation time is 10 minutes.)

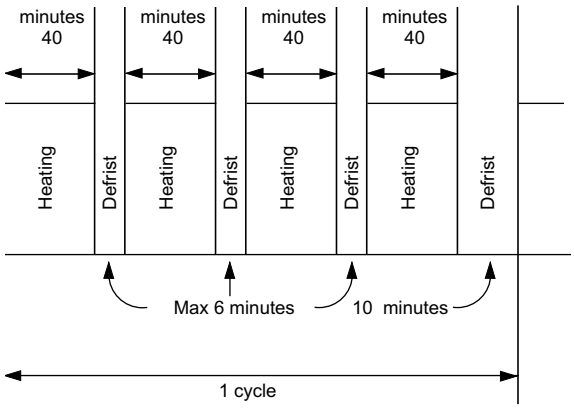


Fig. 8-33

8-17-3. Ending condition at Defrost Operation

When the compressor current becomes 5.5A or more during defrost operation, the defrost operation stops and the heat operation restarts. (The current sensor detects the compressor current.) The defrost operation continues for at most 6 minutes.

DEFROST LAMP:

- During defrost operation, the PRE-DEF. lamp is on and the indoor and outdoor fans are off.
- The compressor start protection timer is interlocked with the PRE-DEF. lamp. So the PRE-DEF. lamp is off (the fans stop) for about 3 minutes after the START/STOP button is turned on. When the compressor is turned on, the PRE-DEF. lamp comes on. After the heat exchanger is preheated to about 30°C or higher, the PRE-DEF. lamp goes off, and the indoor fan starts.

9. TROUBLESHOOTING CHART

Troubleshooting Procedures:

- Following details of “What to be prechecked first”, make sure of the basic items.
- When there is no trouble corresponding to above, check in detail the faulty parts following “How to judge faulty parts by symptoms” later.

9-1. What to be Prechecked First

9-1-1. Power Supply Voltage

The line voltage must be AC 220/230/240V. If the line voltage is not within this range, this air conditioner may not work normally.

9-1-2. Incorrect Cable Connection between Indoor and Outdoor Units.

The indoor unit is connected to the outdoor unit with 5 cables. Make certain that the indoor and outdoor units have been connected properly, with terminals assigned the same numbers wired to each other. If the connectors are not connected as specified, the outdoor unit will not operate normally. It should be noted that if terminals 1 and 3 or terminals 1 and 4 are connected together by mistake, some copper foil patterns on the control section PC board may be broken.

9-1-3. Misleading but Good Operations (Program Controlled Operation)

The microcomputer performs the operations listed in Table 9-1 to control the air conditioner. If a claim is made on the operation, check whether it corresponds to the contents in the Table 9-1. If it does, it is an indispensable operation for the control and maintenance of the air-conditioner: it is not a failure of the unit.

- **Misleading but good operations**

Table 9-1

Operation of air-conditioner	Description
When the POWER plug socket of the indoor unit is inserted, the OPERATION lamp on the setting indication part flashes.	The OPERATION lamp flashes, indicating that power is turned on. If this happens, press the START/STOP button once to cause the lamp to stop flashing. A power outage also causes the lamp to flash.
Fan speed remains unchanged in teh dry mode.	Fan speed is fixed at Low in the dry mode.
Room temperature is in the range under which the compressor is turned off, but the compressor will not stop.	The compressor will not stop while the compressor on-hold timer (two-minute timer) is actuated.
The compressor will not switch on or off even when the thermo control is operated in the dry operation.	In the dry mode, the compressor goes on and off at regular intervals, independent of the Thermo control.
The PRE.-DEF. lamp comes on when the heating operation is started.	The PRE.-DEF. lamp comes on during defrost operation and when the indoor heat exchanger temperature is low when the heating operation is started. At this time, the indoor fan is stopped to prevent cold air from drifting into the room.
The outdoor fan stops once in a while during the heating operation.	• Whent eh indoor heat exchanger temperature is high, the outdoor fan may be stopped by teh high-temprature limit control operation. • When the compressor current is large, the outdoor fan may be stopped by teh current control operation.

9-2. Primary Judgement of Trouble Sources

9-2-1. Role of Indoor Unit Controller

The indoor unit controller receives the operation commands from the remote control and assumes the following functions.

- Measurement of the draft air temperature of the indoor heat exchanger by using the thermo. sensor (T_A)
- Louver motor control
- Control of the indoor fan motor operation
- Control of the LED display
- Control of the outdoor unit compressor and the outdoor fan motor.

9-2-2. Display of Abnormalities and Judgement of the Abnormal Spots

The indoor unit of this machine observes the operation condition of the air conditioner and displays the contents of the self-diagnosis as block displays on the display panel of the indoor unit.

Table 9-2

Block display	Check code	Self-diagnosis	Check code
OPERATION display flashing (1 Hz)	–	Power failure (When power is on)	–
OPERATION display flashing (5 Hz)	00	Thermo sensor (T_A) short/break	0C
OPERATION display flashing (5 Hz)	00	Heat exchanger sensor (T_C) short/break	0d
OPERATION display flashing (5 Hz)	00	Indoor fan lock, abnormality of indoor fan, IC03, D15 short/break	11
OPERATION display flashing (5 Hz)	00	Indoor PC board failure	12
OPERATION and TIMER display flashing (5 Hz)	01	Thermal fuse is blown. (Indoor fan motor is overheat.)	04
OPERATION, TIMER and PRE.-DEF display flashing (5 Hz)	03	• Gas shortage, other refrigerant cycle trouble • Heat exchanger sensor operan/short • Overload relay trouble	09
OPERATION, TIMER and PRE.-DEF display flashing	03	• Compressor trouble	1d

(1) Judgement from defective operation or abnormal operation

Table 9-3

System	Check		Primary judgement
No reaction on remote control operation	Turn off the power once, turn it on again and try to operate the remote control again.	Remote control is not possible.	The indoor part (including the remote control) is defective.
		Remote control is possible.	O.K.
The outdoor fan does not rotate	The compressor operates.		The outdoor part is defective (outdoor fan motor)
	The compressor does not operate.		The inside part is defective.

(2) Self-diagnosis with remote controller

With the indoor unit controller, self-diagnosis of protective circuit action can be done by turning the remote controller operation into service mode, operating the remote controller, observing the remote controller indicators and checking whether OPERATION lamp flashes (5 Hz).

Note:

- To perform this self-diagnosis, the remote controller with the service code of 43069666 is required.

<How to select remote controller operation mode>

1) Selecting service mode

Push the switch button provided on rear bottom of the wireless remote control with a tip of pencil for more than 3 seconds. Make sure the setting temperature "00" is displayed on the display and other display is turned off.

2) Selecting ordinary mode

Push the all clear button (ACL) on the rear bottom of the wireless remote control with a tip of pencil for more than 3 seconds. Make sure the operation mode display, wind volume display, clock display and setting temperature display are turned on and " : " of the clock display is blinking.

<Cautions when doing service>

1) After completion of servicing, always push the all clear (ACL) button to return the operation mode to the normal mode.
2) After completion of servicing by the check code, turn off the power once and then turn on the power to reset memorized contents of the microcomputer to the initial status.

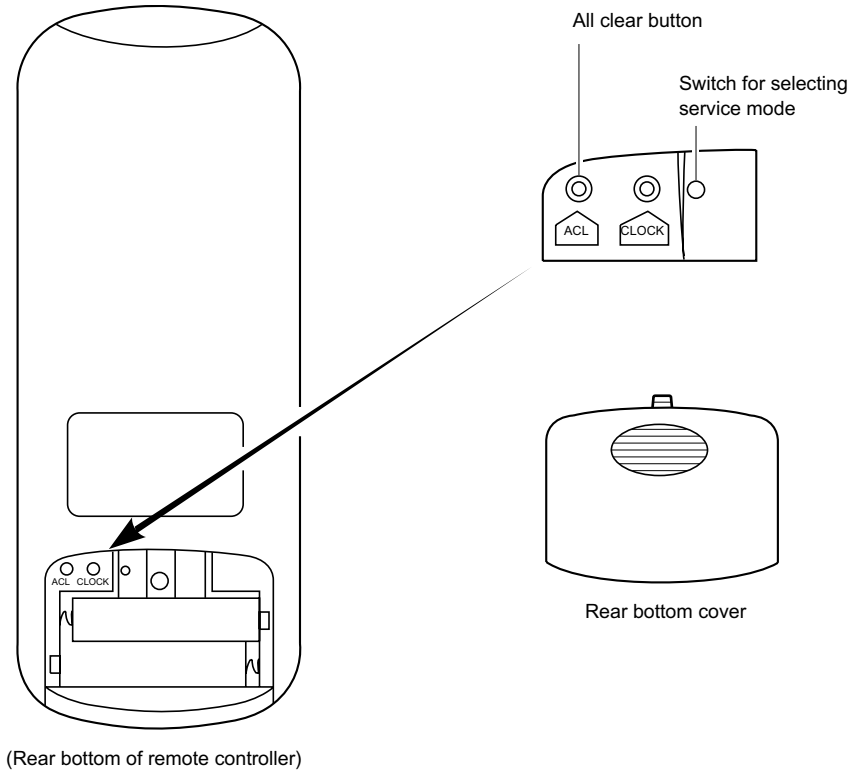


Fig. 9-1

<Self-diagnosis by check codes>

1) The self-diagnosis by the check codes is conducted under the block displays of item B-E.

2) Remote control key operation under the service mode is conducted by ON/OFF or TEMP.

   The remote control display by each key operation is varied as shown below. Two digit number is displayed in a hexadecimal number.

Table 9-4

Operating key	Indication after operation
ON/OFF	"00"
TEMP. △ (Up)	1 is added to data before operation. (Example) "02" → "03"
TEMP. ▽ (Down)	1 is subtracted from data before operation. (Example) "02" → "01"
"AUTO" LOUVER	10 is subtracted from data before operation. (Example) "02" → "12"
"SET" LOUVER	Data before operation is directly transferred. (Example) "02" → "02"

3) The self-diagnosis by the check codes is conducted with procedures shown below.

a) Enter the service mode and make sure the off timer display of the remote control shows "00".

b) Operate the "ON/OFF" key and make sure the timer lamp on the display section is flashing (5 Hz).

c) At the same time, also make sure the operation lamp is also flashing. This shows that the protection circuit on the indoor PC board is working.

d) Operate the TEMP. △ key and make sure the remote control display shows "01" and flashing of the operation lamp. If the operation lamp is flashing, it shows the protection circuits for connecting cable is working or thermal fuse is blown.

e) In the same way, operate the TEMP. △ key so that the display is increased one by one to continue checks by the self-diagnosis as shown is the next table. From "00" up to "03" check operations of protection circuits for each block, and "04" to "1F" check operations of the typical protection circuits.

Table 9-5

Block level		Diagnosis function				Judgement and action
Check code	Block	Check code	Symptom	Air conditioner status	Condition	
00	Indoor PC board	08	Thermo sensor short/break.	Continued operation	Indicated when detected abnormal.	• Check thermo sensor. • If it is OK, check PC board. (Around sensor circuit)
		0d	Heat exchanger sensor short/break.	Continued operation	Indicated when detected abnormal.	• Check heat exchanger sensor. • If it is OK, check PC board. (Around sensor circuit)
		11	Indoor fan lock, abnormality of indoor fan.	All off.	Indicated when detected abnormal.	• Check motor. • Replace PC board, if the same failure occurs, after the motor check.
		12	Abnormality of other indoor unit PC board.	Continued operation	Indicated when detected abnormal.	Replace PC board.
01	Cable connection/ Thermal fuse	04	• Thermal fuse cut off. • Indoor fan lock, abnormality of indoor fan.	All off.	Indicated when detected abnormal.	• Check thermal fuse. • If it is OK, check motor. • If motor is OK, check PC board. (12V power circuit)
03	Refrigerant system	09	• Gas shortage. (gas leak) • Other refrigerant cycle trouble. • Heat exchanger sensor off/ break/short. • Overload relay break	All off.	Indicated when detected abnormal.	• Check gas quantity. (Check gas leakage) • If it is OK, check heat exchanger sensor. • If heat exchanger sensor is OK, check overload relay. • If overload relay is OK, check refrigerant cycle. • If refrigerant cycle is OK, check PC board.

9-3. Troubleshooting Flowcharts

9-3-1. Power cannot be Turned on (No Operation at All)

<Preliminary checks>

(1) Is the supply voltage normal?

(2) Is the connection to the AC output O.K.?

(3) Are the connection of the primary side and the secondary side of the power transformer inserted into the PC board?

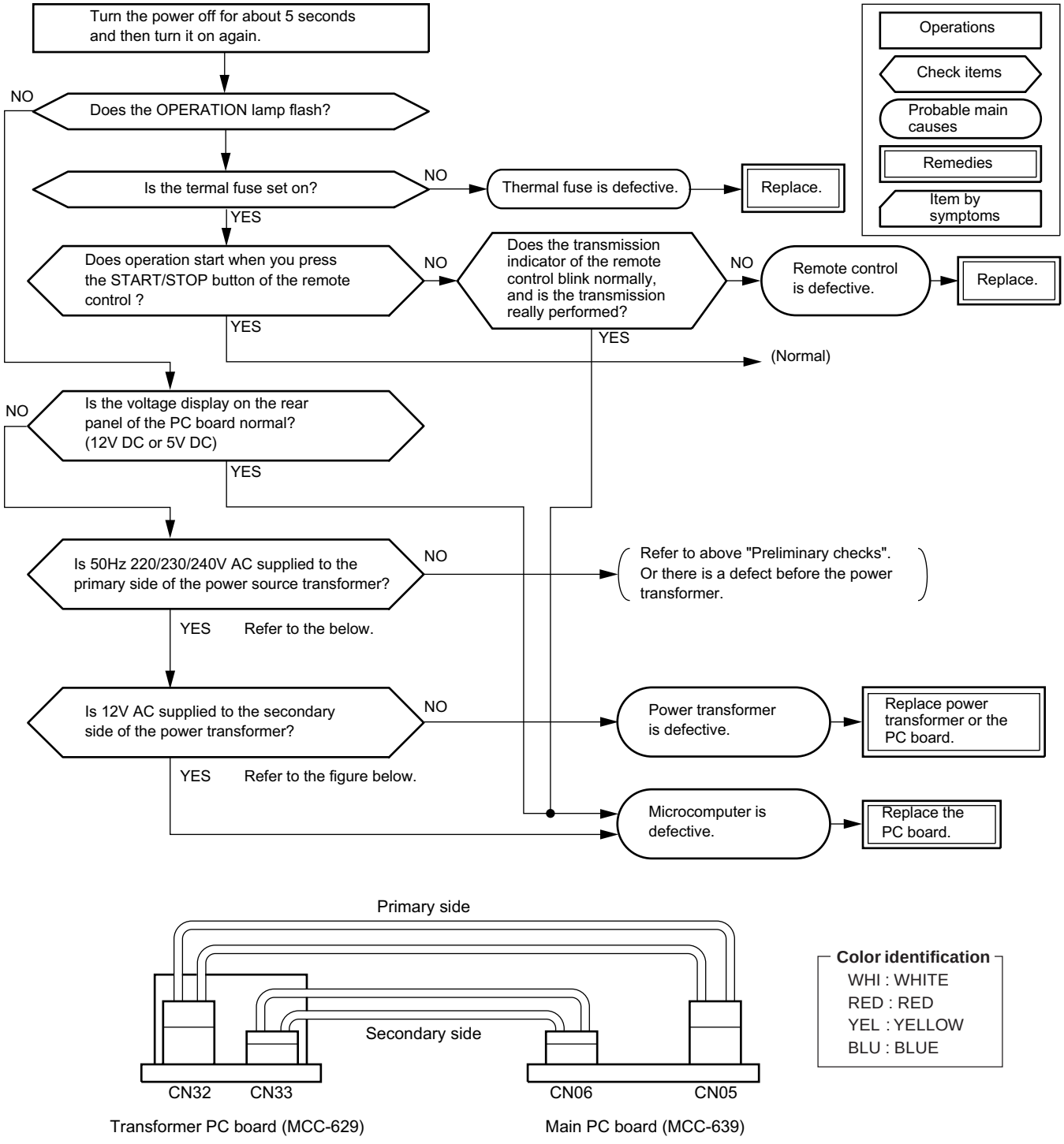
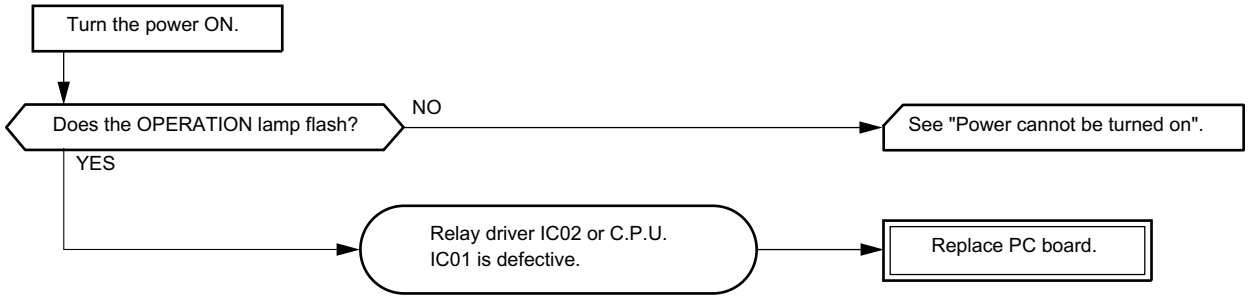

Turn the power off for about 5 seconds and then turn it on again.
Does the OPERATION lamp flash?
NO
Is the termal fuse set on?
NO
Thermal fuse is defective.
Replace.
YES
Does operation start when you press the START/STOP button of the remote control ?
NO
Does the transmission indicator of the remote control blink normally, and is the transmission really performed?
NO
Remote control is defective.
Replace.
YES
YES
(Normal)
Is the voltage display on the rear panel of the PC board normal? (12V DC or 5V DC)
NO
YES
Is 50Hz 220/230/240V AC supplied to the primary side of the power source transformer?
NO
Refer to above "Preliminary checks". Or there is a defect before the power transformer.
YES
Refer to the below.
Is 12V AC supplied to the secondary side of the power transformer?
NO
Power transformer is defective.
Replace power transformer or the PC board.
YES
Refer to the figure below.
Microcomputer is defective.
Replace the PC board.
Operations
Check items
Probable main causes
Remedies
Item by symptoms
Primary side
Secondary side
CN32
CN33
CN06
CN05
Transformer PC board (MCC-629)
Main PC board (MCC-639)
Color identification
WHI : WHITE
RED : RED
YEL : YELLOW
BLU : BLUE

Fig. 9-2 Power transformer connection diagram

9-3-2. Relay RY07, RY08 do not Operate.

Louver is not controlled automatically.


Turn the power ON.
Does the OPERATION lamp flash?
NO
See "Power cannot be turned on".
YES
Relay driver IC02 or C.P.U. IC01 is defective.
Replace PC board.

Note:

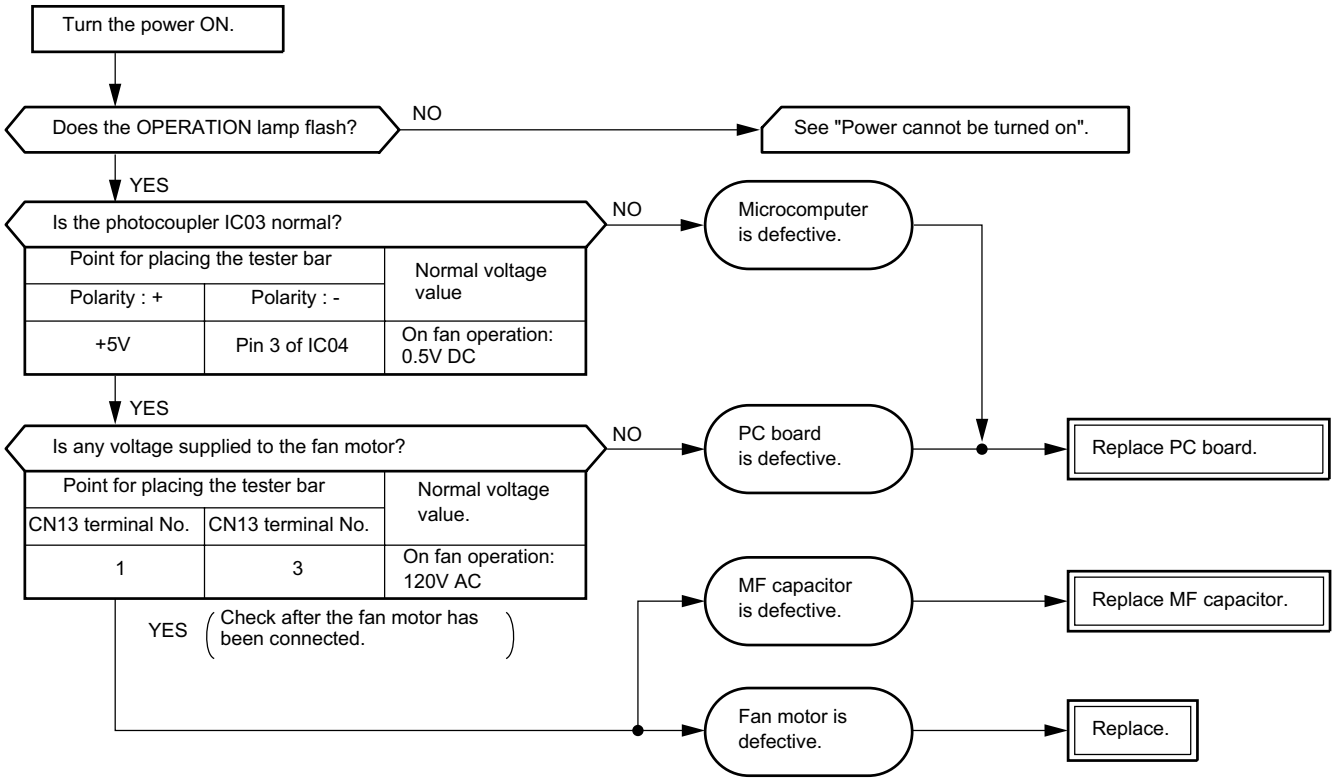
- When wiring to the thermal fuse has been broken, the timer lamp and operation lamp will flash with 5 Hz.

9-3-3. Only the Indoor Fan does not Operate.

<Preliminary checks>

Does it neither work in COOL or FAN ONLY operation?

< Check procedure >



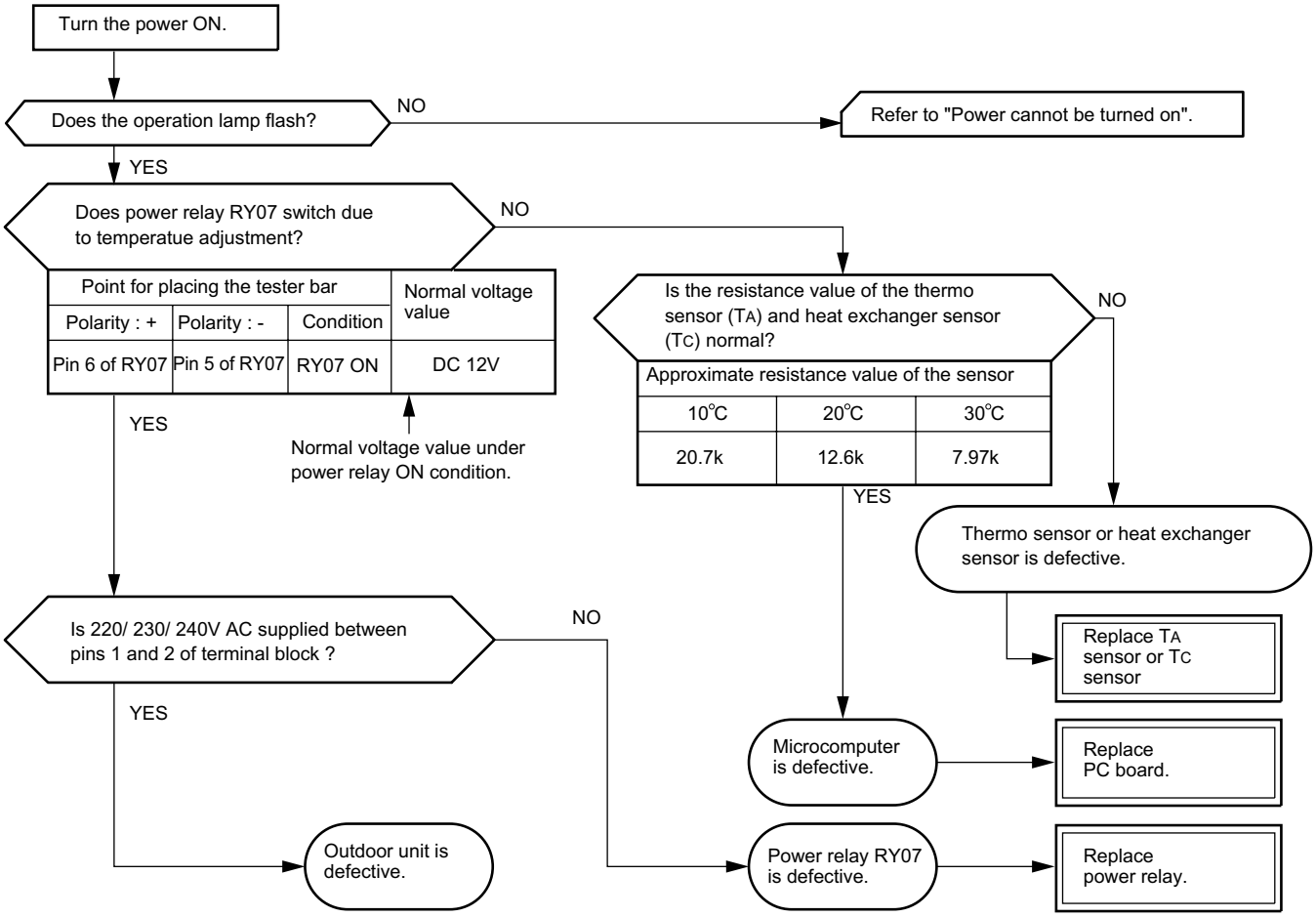
9-3-4. Compressor does not operate. (Indoor fan also does not turn.)

< Preliminary checks >

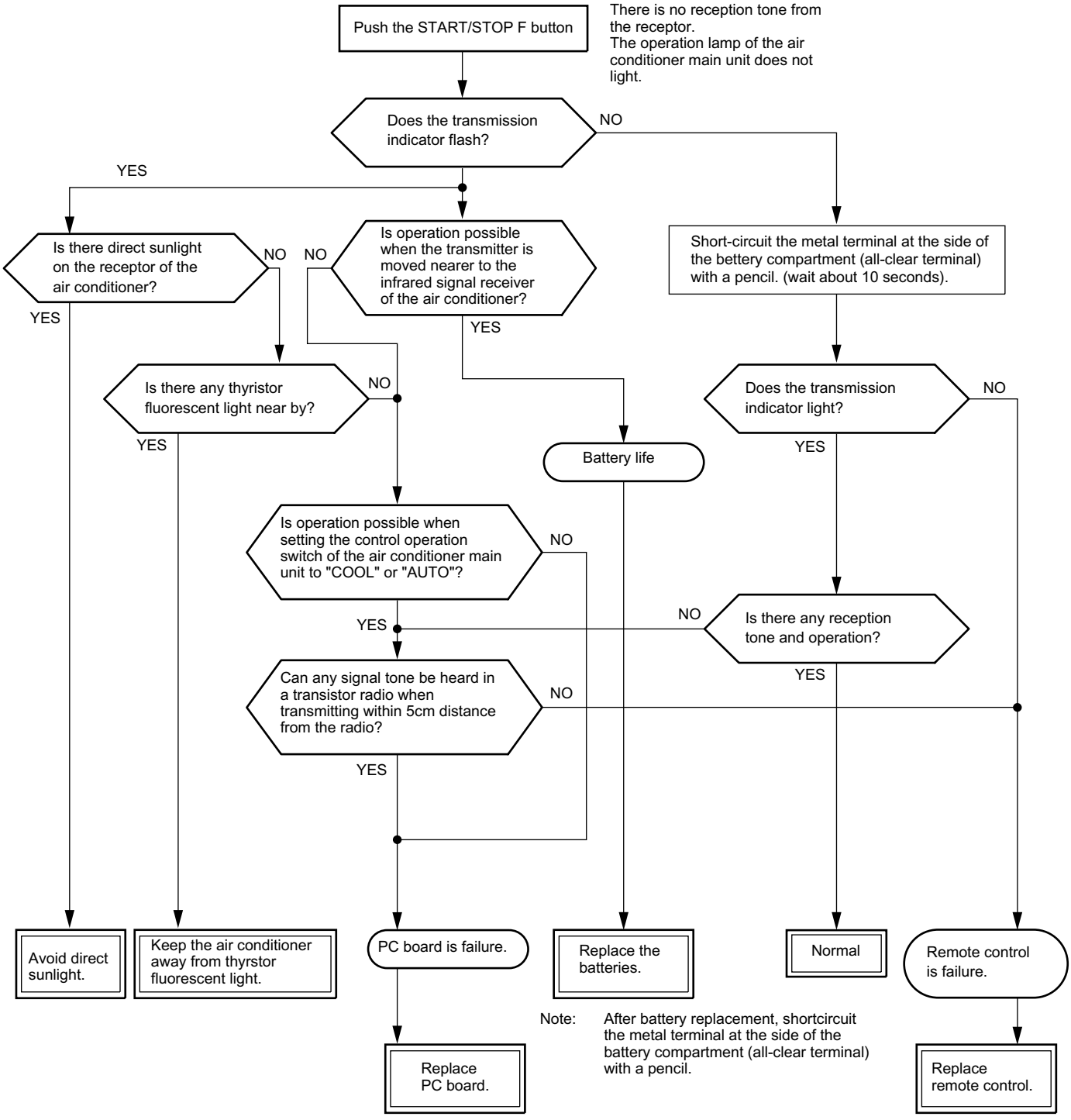
(1) Is the temperature set on the remote control higher than the room temperature in cool operation?

(2) Is contact of the crossing wiring O.K.?

< Check procedure >



9-5. How to Check the Remote Control (Including the Indoor PC Board)


Push the START/STOP F button
There is no reception tone from the receptor.
The operation lamp of the air conditioner main unit does not light.
Does the transmission indicator flash?
NO
YES
Is there direct sunlight on the receptor of the air conditioner?
NO
YES
Is operation possible when the transmitter is moved nearer to the infrared signal receiver of the air conditioner?
NO
YES
Short-circuit the metal terminal at the side of the bettery compartment (all-clear terminal) with a pencil. (wait about 10 seconds).
Is there any thyristor fluorescent light near by?
NO
YES
Battery life
Does the transmission indicator light?
NO
YES
Is operation possible when setting the control operation switch of the air conditioner main unit to "COOL" or "AUTO"?
NO
YES
Is there any reception tone and operation?
NO
YES
Can any signal tone be heard in a transistor radio when transmitting within 5cm distance from the radio?
NO
YES
Avoid direct sunlight.
Keep the air conditioner away from thyrstor fluorescent light.
PC board is failure.
Replace the batteries.
Normal
Remote control is failure.
Replace PC board.
Replace remote control.
Note: After battery replacement, shortcircuit the metal terminal at the side of the battery compartment (all-clear terminal) with a pencil.

9-5-1. How to check the PC board

(1) Operating precautions

1) When removing the front panel or the PC board, be sure to disconnect the power plug from the AC outlet.
2) When removing the PC board, hold the edge of the PC board and do not apply force to the parts.
3) When connecting or disconnecting the connectors on the PC board, hold the whole housing. Do not pull at the lead wire.

(2) Inspection procedures

1) When a PC board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this PC board.
2) The PC board consists of the following 4 parts:

a. Main PC board part:

Power relay, indoor fan motor drive circuit and control circuit, C.P.U. and peripheral circuits, buzzer drive circuit and buzzer.

b. Light receiving unit:

Light receiving circuit

c. Display: LED

d. Switch PC board:

Wireless-control, temporary switch

Check the defects of the PC board following the list below.

(3) Checking procedure

Table 9-7

Procedure	Check point (Symptom)	Trouble cause
• Disconnect the power plug from the AC outlet and remove the PC board assembly from the electronic parts base. • Remove the flat cable from the terminal plate.	Is the fuse blown?	• Application of shock voltage • Short-circuit of the indoor fan motor
• Turn the power ON.	Check power supply voltage.	
• If the operation lamp flash (0.5 sec. ON, 0.5 sec. OFF), steps 1 – 3 in the right column are not necessary.	1. Between pins 1 and 3 of CN01 (220/230/240V AC)	• Defective power cord, power switch, fuse or line filter, or wrong wiring
	2. Between pins 1 and 3 of CN02 (12V AC)	• Defective power transformer
	3. Between Q01 emitter and GND (5V DC)	• Defective power circuit or short-circuited load
	4. Between Q03 emitter and GND (12V DC)	• Defective power circuit or short-circuited load
	5. Between pin 1 and GND of CN11 (12V DC)	• Thermal fuse operation
Push the START/STOP button once to set in operation mode. (Do not set to the fan only or on-timer mode.)	Check power supply voltage.	
	1. Power relay coil voltage (12V DC) (pins 5 and 6 of RY7)	• Relay coil cable is broken, relay driver (IC181) is defective.
	2. Between pins 1 and 2 of PF terminals	• Relay contact is defective, PF terminal is defective.
Start operation by using the anti-restart timer.	• All LEDs of the operation lamp, the timer lamp and the FAN ONLY lamp light up. • After 3 seconds, normal display does not appear.	Display is defective or defect in the 4P housing assembly.

Procedure	Check point (Symptom)	Trouble cause
Push the START/STOP button once to set in operation mode. 1. Setting the anti-resistor timer 2. Cooling operation 3. Fan speed: AUTO 4. Set the temperature sufficiently lower than the room temperature. 5. Continuous operation	1. The compressor does not operate.	• The temperature of the Indoor heat exchange unit is extremely low.
	2. The operation lamp flashes.	• Defective control PC board.
Connect the motor connector to "MOTOR" and turn the power ON. Start operation as follows: 1. Set the operation mode to "FAN ONLY". 2. Set the fan speed to "HIGH". 3. Continuous operation	1. There is a voltage of 120V or more between the red and black motor connector leads.	• Indoor fan motor is defective.
	2. The motor does not rotate. (But the key operation of the remote control is accepted.)	• Contact of the motor connector is defective.
	3. Motor rotates but vibrates hard.	• Main PC board is defective.

Table 9-8 Approximate value of the sensor (thermistor) resistance (T_A, T_C)

(= kΩ)

Temperature / Sensor	0°C	10°C	20°C	25°C	30°C
Thermo Sensor	35.8	20.7	12.6	10.0	7.92

9-5-2. How to Reduce the Operation Time of the Anti-restart Timer

- Drill 2 holes on the rear of the wireless remote control unit.

  Attach the diode (1S1555 or equivalent) to the rivet inside the unit.
- Push the START/STOP button to start operation with the diode attached.

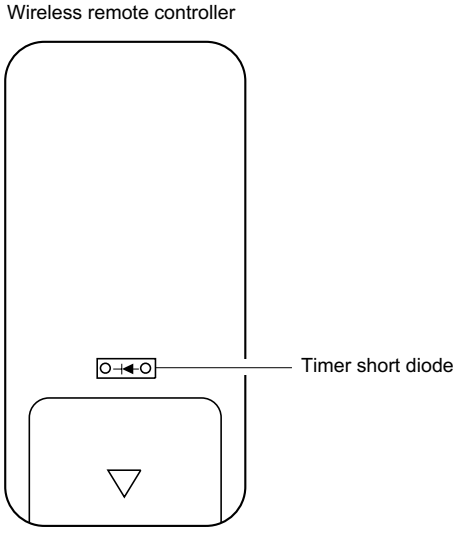


Fig. 9-3

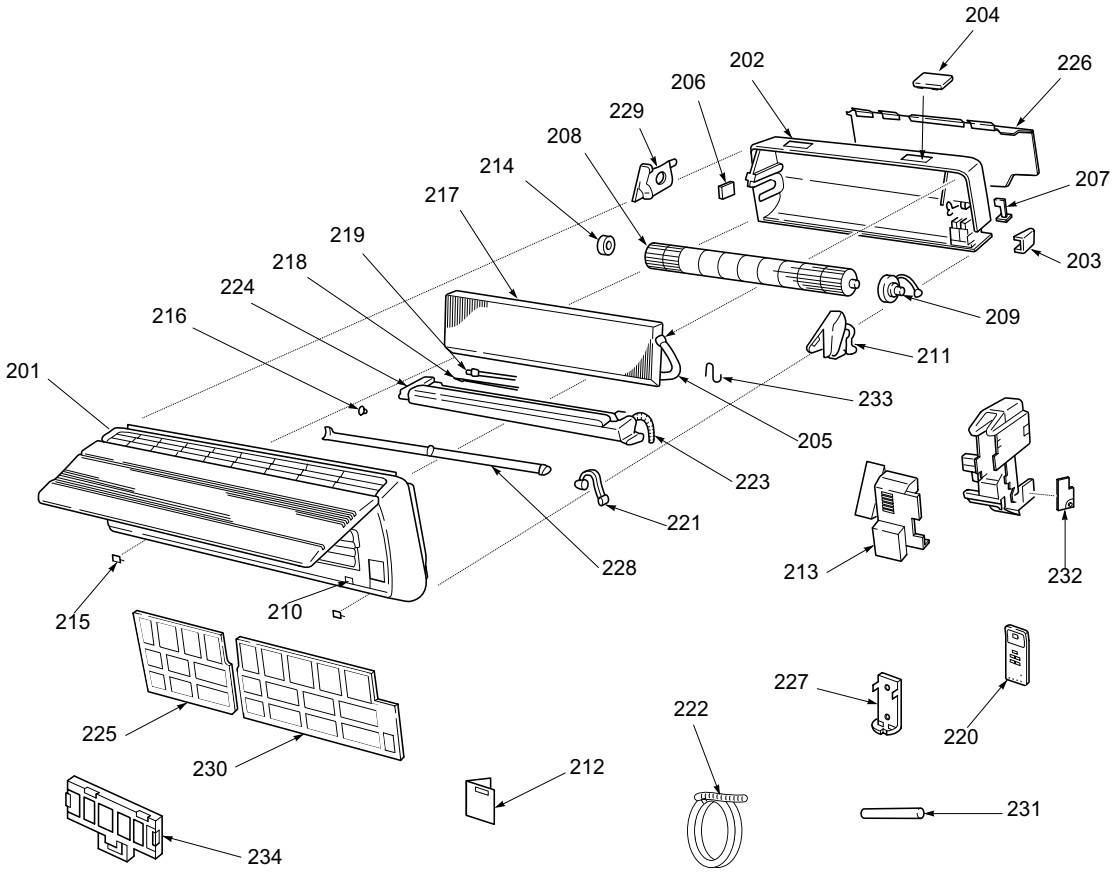
9-6. PC Board Layout

Top view

Bottom view

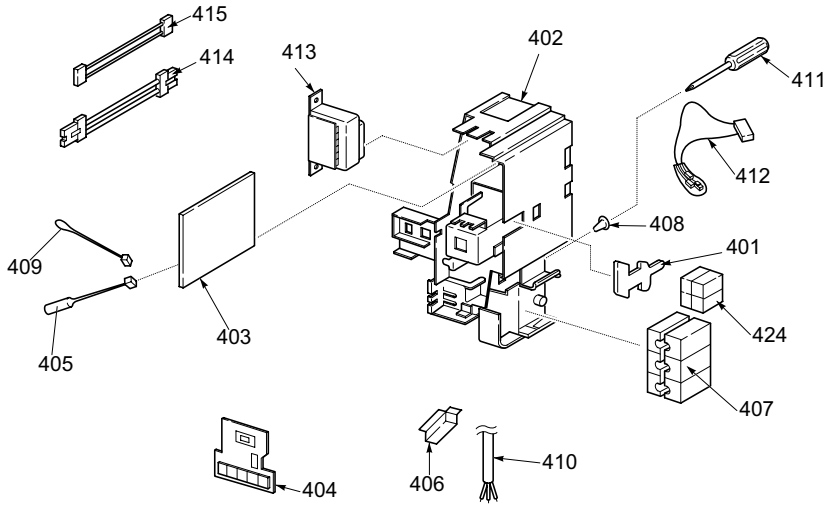
10. EXPLODED VIEWS AND PARTS LIST

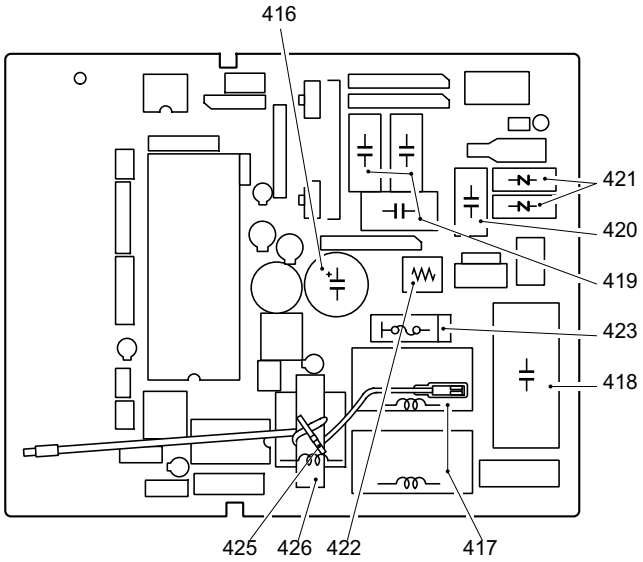
10-1. Indoor Unit



Location No.	Part No.	Description
201	43005210	Front Panel (EKH)
202	43003218	Rear Plate
203	43007963	Bush, Rear Plate, Right
204	43007967	Lid, Rear Plate
205	43011503	Pipe Sealed
206	43007964	Bush, Rear Plate, Left
207	43019836	Holder Pipe
208	43020244	Fan, Cross Flow
209	43021990	Fan Motor, AFP-200-18-2B
210	43007842	Latch
211	43039250	Motor Band Left
212	43086989	Owner's Manual (EKH)
213	43006216	Cover, E-Parts (EK)
214	43022321	Bearing
215	43007098	Cap Screw
216	43007843	Bushing
217	43044559	Evaporator

Location No.	Part No.	Description
218	43047331	Pipe, Delivery
219	43047332	Pipe, Suction
220	43069858	Remote Controller
221	43021794	Motor, Louver
222	43070090	Hose, 3M, Drain
223	43070140	Hose, Drain
224	43009450	Drain Pan and Grill
225	43080359	Air-Filter, Left
226	43082271	Plate, Inst, Assembly
227	43063278	Holder, Remote Controller
228	43009498	Grille
229	43039251	Base Bearing
230	43080358	Air-Filter, Right
231	43011499	Pipe Sealed
232	43008691	Terminal Cover
233	43019822	Holder, Sensor
234	43080349	Frame Filter

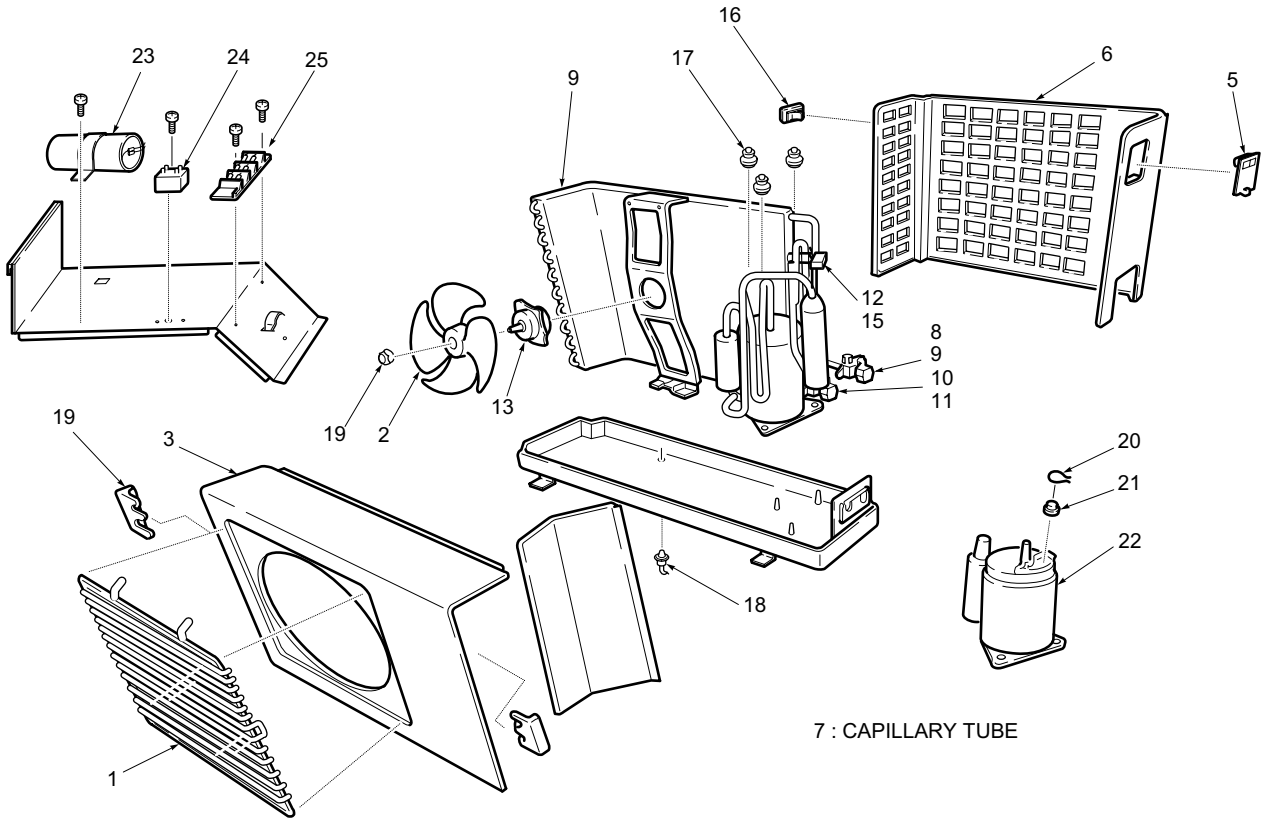




Location No.	Part No.	Description
401	43063286	Holder-P.C. Board
402	43061195	Base, E-Parts
403	43068418	P.C. Board Assembly
404	43068419	P.C. Board Assembly Switch
405	43068011	Sensor, Heat Exchanger
406	43069573	Receiver, Infrared Rays
407	43060794	Terminal-Block
408	43097195	Tamper-Proof-Screw
409	43069627	SS-Sensor, Thermostat
410	43060023	Cord, Power
411	43082263	Screw-Driver
412	43060007	Thermal Fuse Set
413	43068355	P.C. Board Assembly, Trans
414	43060025	Lead Assembly (Transformer Primary)

Location No.	Part No.	Description
415	43060026	Lead Assembly (Transformer Secondary)
416	43033182	Capacitor, Electrolytic
417	43054399	Relay Power
418	43055412	Capacitor, 1.0MFD, 400V
419	43033211	Capacitor, Film
420	43033213	Capacitor, ECQ-UV, 0.1MFD, 250V
421	43055284	Toshiba Non Linear Resistor
422	43032488	Posistor, 820HM
423	43060013	Fuse, Time Delay
424	43060778	Terminal-Block
425	43060548	Nylon Tie
426	43058193	CT, Current-Trans

10-2. Outdoor unit



Location No.	Part No.	Description
1	43019769	Guard, Fan
2	43020223	Fan, Propeller
3	43005037	Front Cabinet
4	43043548	Condenser
5	43062194	Cover, E-Parts
6	43005038	Back Cabinet
7	43047491	Capillary Tube 1.5DIA
8	43046229	Packed Valve, 3/8
9	43047401	Bonnet, 3/8
10	43046228	Packed Valve, 6.35
11	43147196	Bonnet, 6.35DIA
12	43046248	4 Way-Valve, VH7100D
13	43021928	Fan-Motor, UE6-21A5P
14	43047549	Flange, Nut
15	43046255	Solenoid Coil
16	43019727	Handle

Location No.	Part No.	Description
17	43049643	Rubber-Cushion
18	43032441	Nipple, Drain
19	43019770	Stopper, Guard
20	43069988	Holder, OL-Relay
21	43054400	Relay, Overload (RAS-07EAH)
21	43054401	Relay, Overload (RAS-09EAH)
22	43041142	Compressor, PH70T1-4C (RAS-07EAH)
22	43041564	Compressor, PH94T1-4C (RAS-09EAH)
23	43055470	Capacitor, Plastic Film, 15MFD, 400V
24	43055409	Capacitor, 1.5MHD, 400V
25	43060049	Terminal Block, 5P

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